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The Chemical Age

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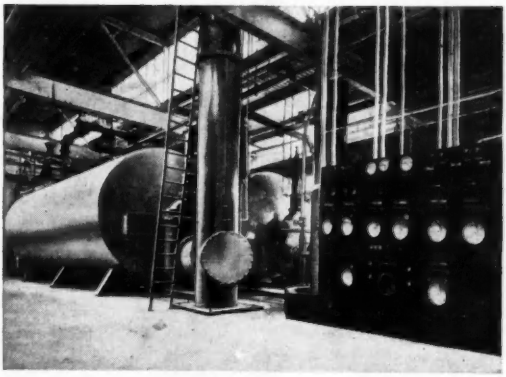

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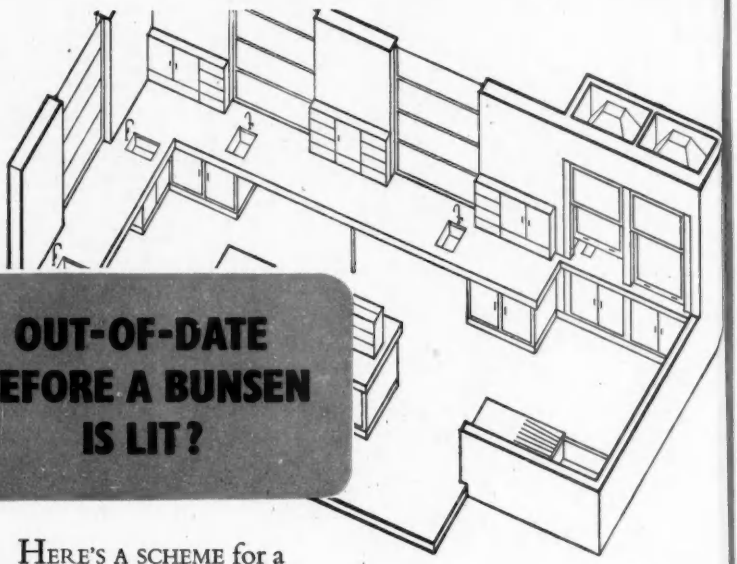

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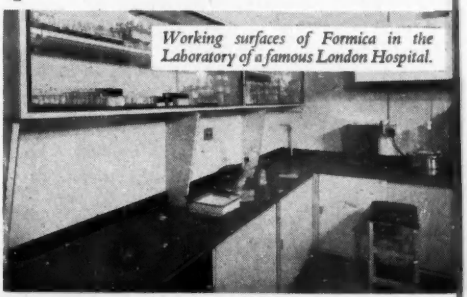

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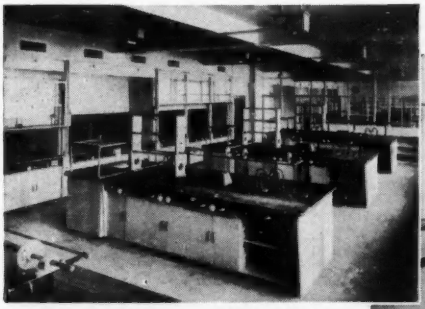

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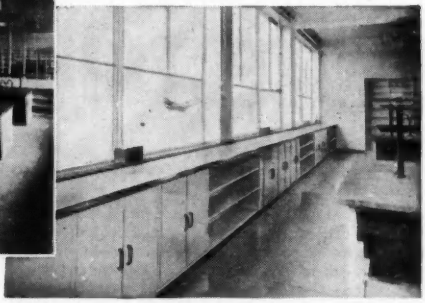

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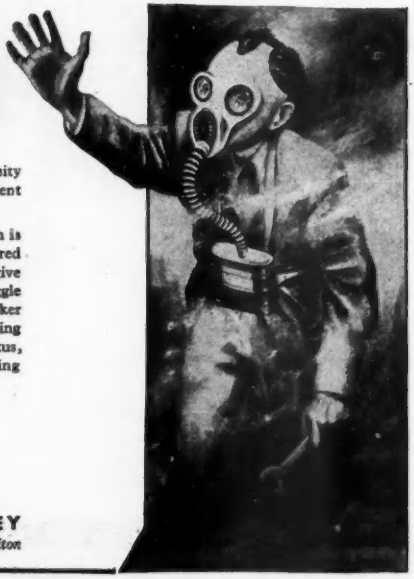

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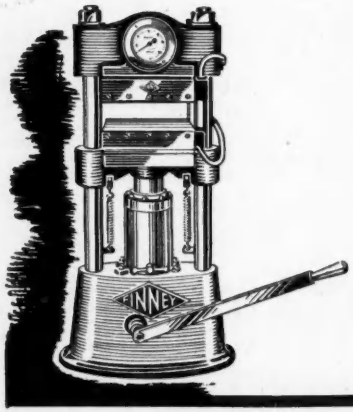

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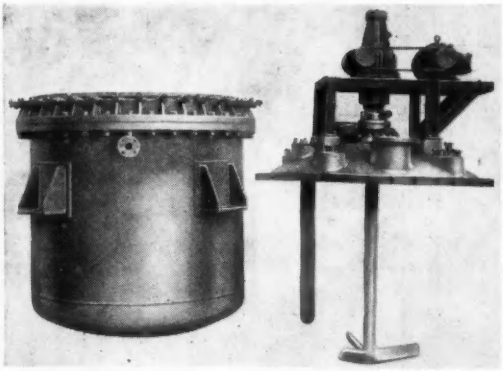

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Volume LXVII 23 August 1952 Number 1728

The Future of Britain

IN its issue for Sunday, 10 August, *The Observer* carried a four-column leader. There have been annual Government 'Economic Surveys' since the war and two Prime Ministers, with several Chancellors and Board of Trade Presidents, have made speeches about our housekeeping problems, but none of these efforts to lead or educate us, nor indeed all of them put together, have diagnosed the basic troubles or prescribed the means of treatment as sensibly or clearly. We may have been over-expectant to believe that comparable sense or clarity could emerge from the bedevilments of party politics and even more foolish to think that official Economic Surveys could provide stronger diet than inoffensive platitudes. But it has surely been plain since 1947 and devaluation that our recurrent economic crises are symptoms of some fundamental breakdown which must itself be understood and treated before hopes of recovery can be entertained. Like several other technical and scientific publications, from time to time we have expressed views similar to those of our Tudor Street colleagues, for the real problem is not solely economic but technico-economic and, as such, it has been more obvious to scientists than non-scientists.

'The two basic facts of world economy today,' states *The Observer*, 'are that population is increasing faster than food production: and manufacturing industries faster than the supply of raw materials.' These are inescapable and settled trends. Both bear relentlessly upon our own national economy. Britain's economy from the industrial revolution onwards has been expansively based upon the importation of food and upon the conversion of raw materials, also much imported, into manufactured goods. In 1846 our population was 19,000,000, now it is 50,000,000. Without exaggeration it can be said that three out of every five inhabitants of the United Kingdom exist because in the past we have bought from abroad a high proportion of our food and paid for it by selling industrial products. For generations this was a profitable national pattern of work and commerce, for the 'terms of trade' were highly favourable. If we possessed only limited supplies of raw materials at home, we could import them cheaply. We could also buy our food requirements cheaply and liberally. And we could obtain prices that were relatively much higher for our manufactured goods—indeed, for a long time we faced no serious competition. Throughout the long period of economic supremacy and expansion we

have neglected our own agriculture and paid little attention to the development of our own raw materials.

But we cannot hope to cure our new and persistent problems by trying to do more intensively what we successfully did before. To talk of increasing our exports until we 'pay our way' is an obsolete prescription. We have just come to the end of a most lucrative period for export business, a post-war seller's market from which two of our most powerful pre-war competitors have been largely excluded. Our export trade has expanded beyond expectations in some manufactures and notably well in all. But all the time the costs of imported foods and of imported raw materials have been rising.

Relying in the main upon an expansive export policy is, as *The Observer* points out, not an adequate solution either in booms or slumps. At times of boom many other nations compete for the world's limited supplies of food and raw materials; our buying terms are inevitably bad. At times of slump we cannot hope to sell enough of our manufactured goods or to obtain good prices for them. 'We stand to lose either way—and we work on margins so narrow and precarious that any large sudden losses threaten us with stark catastrophe.'

What is the remedy? To make ourselves much less dependent upon imports of food and raw materials and therefore much less dependent upon exports. We shall in any case have to make do with less imported food and with smaller quantities of raw materials, for the time must come when recession in world trade reduces our export earnings. The recurrent crises will not all respond to emergency first-aid. For food the obvious treatment is to produce more from our own farms. No one with good knowledge of agriculture is so naïve as to suppose that the targets for expansion so far set fully reflect technical possibilities. For raw materials, the treatment is threefold. We must take urgent and broadly conceived steps to develop our own resources. We must make sure that those materials we must still import are used with maximum economy. And, third, we must consider whether some of the heavy raw material requirements of certain export industries are in fact showing an adequate 'gain' on their conversion into manufactured goods. The exports upon which we must concentrate are those in which relatively small amounts of raw material are converted into high-priced goods.

It is not irrelevant to recall the 1949 Report of the Committee on Industrial Productivity under the chairmanship of Sir Henry Tizard. Then a Panel on Imports Substitution was set up, one of whose findings was as follows: 'With the possible exception of the agricultural field, it seems clear that no great saving in imports or diversion to more convenient sources can be achieved without substantial capital investment in new plant, either at home or in overseas territories . . . .' The truth of this is no less true in 1952, but the path of capital investment is even harder. Indeed, the whole of the 1949 Report might well be re-read.

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Notes & Comments

Use of Fertilisers

IT is too readily supposed that a fairly full use of fertilisers is regular farming practice in this country. The fact that consumption has increased so considerably above pre-war levels is no doubt the basis of that assumption. But we are in any case producing much more food from our soil and we are importing much less plant-food in the form of animal feeding-stuffs. Over the past two years fertiliser consumption declined as a result of the de-subsidisation policy; since this July, however, a subsidy scheme has returned, different in form though not very different in effect, and at the same time useful reductions in price per ton have been made possible by falls in manufacturing costs, mainly the costs of bags and raw material freightage (on water) charges. Broadly speaking, the economic conditions for expansion have been taken back to almost what they were in 1949 and 1950. Only on the unhappy foundation of technical ignorance can the commercial farmer or grower argue that it will not pay him to use a reasonable quantity of fertilisers appropriate to his crops. But this should not mean merely a steady return towards 1949/50 consumption. It should involve much more. The field for expansion is still immense. The so-called 'cash crops,' those which the farmer sells as such rather than utilise in further production of milk or meat, still seem to receive much of the fertiliser that is bought. Fodder crops and grassland lag behind.

As an interesting example of this, a five-year survey of the field bean crop (*Agriculture*, 1952, **59**, 5, 229) carried out by the University of Oxford may be instanced. A substantial number of field bean crops on different farms were investigated. It was found that 38 per cent of the crops were given no fertiliser at all, 23 per cent received farmyard manure (of which about one quarter also received fertiliser), and 39 per cent received fertiliser. But out of the crops given fertiliser, little more than a quarter were given a full treatment—some 70 per cent of these were given partial dressings supplying one plant-food believed to be especially needed. Yet on the whole the crop was being grown on poorer fields, either indifferent land or land that was known to have been fairly exhaustively cropped in preceding years. Where farmyard manure or fertilisers or both were used the survey showed clearly that yield increases ranging from 18 per cent to 30 per cent were consistently obtained. Field beans may not today be one of the principal crops but some 100,000 acres are still regularly grown. For reasonably full production at least another 12,500 tons of fertiliser should be applied to this crop. This is just one indication—and on a small scale because a relatively minor crop has been cited—of the room that exists for expanding our national use of fertilisers.

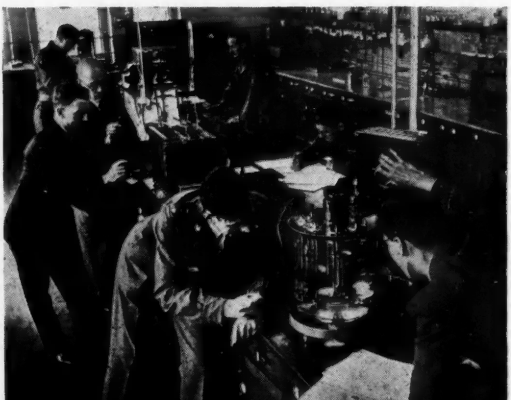
U.S. Research Boom?

THE independent non-profit-taking research establishments of America are showing remarkable jumps in income and activity. According to a report recently published in *Chemical Week* (1952, 9 August, p. 32), the Stanford Research Institute's 1952 income will exceed that of 1951 by 40 per cent. The Armour Research Foundation (31 per cent), the Battelle Institute (33 per cent), Southern Research Institute (27 per cent), Southwest Research Institute (100 per cent), and the Midwest Research Institute (28 per cent) all show similarly striking increases. The comparison of 1952 with 1951 is not uniformly made for the financial years of the various organisations differ, but it is clear enough that there is a generally expansive trend. Broadly speaking, both government and industry can use these research organisations; special tasks can be sponsored and it is often cheaper than creating new facilities or adding to the programmes of official or private centres. It would appear that the U.S. Government has entrusted some of its defence research to the independent institutes, for in some cases the government/industry ratio (of income received) has shifted to either a 1:1 balance or past this point

to a governmental 'lion's share.' Except for the limited case of agricultural research centres (for example Rothamsted), there is nothing comparable in the United Kingdom. When the necessity for new and large-scale research tasks is realised, new facilities must be created; and the finding of a new building or the expansion of an old one, plus the acquisition of suitable staff, comprise a problem just as severe as those of research itself. It might be said that grants made to the scientific departments of our major universities follow a similar pattern of patronage or sponsorship but the comparison is only thinly valid; for example, the staff of the Stanford Research Institute now numbers 500. Nor are our industrial research associations comparable establishments. As centres of investigation they are much more narrowly specialised and variegated research projects cannot be passed to them. Beyond any doubt the existence of these independent research institutes in America is an enormous national asset and Britain has been slow to follow their example. Yet in a sense it was an Englishman who first set the example more than a century ago—when James Smithson, embittered by his high-born illegitimacy here, left his entire fortune to found the Smithsonian Institution, America's first sizeable scientific organisation.

Founder of Stereochemistry

THIS year marks the centenary of the birth of a distinguished group of European scientists—Sir William Ramsay, Britain; Ferdinand Fréderic Henri Moissan, France; Emil Fischer, Germany; and Jacobus Heinricus van't Hoff, Holland; all of whom were Nobel chemistry prize-winners and whose work has had a lasting influence on chemical development. Of these, Jacobus Heinricus van't Hoff, who was born in Rotterdam on 30 August, 1852, is of interest both to physical and organic chemists, although his name is probably better known to the latter for his epoch-making theory of the tetrahedral carbon atom, published in 1874, which, although attacked by Kolbe, was soon accepted and laid the foundation stone of stereochemistry. Le Bel, an Alsatian chemist, also published his ideas on tetrahedral models some two months after van't Hoff, although it is known that these two young men, both in their twenties, had not discussed their theories. van't Hoff continued the earlier work of Kekulé, under whom he began his experimental investigations at Bonn, and extended his structures to explain the geometrical isomerism of maleic and fumaric acids. To the physical chemists the Dutch chemist is renowned for his 'Etudes de Dynamique Chimique.'



The fuel and lubricants laboratory, applied chemistry branch of the Military College of Science at Shrivenham, near Swindon, which the Duke of Edinburgh will visit on 21 November

Chemistry & Fire Prevention

Report of the Fire Research Board for 1951 Issued

THE importance of chemical investigation into the initiation, growth and suppression of fire and the behaviour of materials in fires is emphasised in 'Fire Research, 1951,' the reports of the Fire Research Board and the Director of Fire Research (Mr. S. H. Clarke), issued by the Department of Scientific and Industrial Research (HMSO, 2s. 1½d., post paid).

Work on the inflammability limits of gases in air was considerably extended by investigators working under the direction of Dr. J. H. Burgoyne at the Department of Chemical Engineering and Applied Chemistry, Imperial College of Science and Technology, London.

Using the vessel 2 in. (5 cm.) diameter by 11 in. (28 cm.) long, mentioned in the report of the previous year, detailed measurements were made of inflammability limits in air from atmospheric pressure down to the extinction pressure and at atmospheric and higher temperatures.

These observations were supplemented by detailed measurements of spontaneous ignition limits in the sub-atmospheric pressure range, using the same vessel.

Combustible materials thus studied were propane, ethylene, ethylene oxide and dimethyl ether, typifying four different classes of material but at the same time being among the most simple of their class.

Variations in the upper limit phenomena proved to be of the most interest and upper limit flame products were studied in some detail in the case of ethylene. From the results obtained it was clear that with ethylene as with ethylene oxide, a flame of remarkably low temperature was able to propagate.

Limit Flame Tests

It was not easy to believe that such propagation could occur by thermal means and it was tentatively concluded that a rapidly diffusing chain carrier must be responsible.

Comprehensive calculations of limit flame temperatures were undertaken, based on limit measurements already reported, as well as those of workers under comparable conditions. It was found that a similar comment was applicable to the lower limits of ethylene and other olefines, hydrogen, carbon monoxide, carbon disulphide and acetylene. The results of these investigations to date were being prepared for publication.

Research into the action of methyl bromide as a flame suppressor had been concluded for the time being and the results were being summarised for publication.

Methyl Bromide

During the year, the influence of methyl bromide upon the combustion of hydrogen and carbon monoxide had been examined in three ways.

First, following the work of Burgoyne and Williams-Leir on the effect of methyl bromide on the limits of inflammability (*inter alia*) of hydrogen and carbon monoxide in air, chemical analyses were made of the products formed when flame was passed through various near-limit mixtures in a wide tube. From the results it was possible to calculate the maximum flame temperatures in limit mixtures and to learn something about the factors which determined the limits.

Secondly, analysis was made of the products obtained when hydrogen and carbon monoxide were burnt at a jet in the presence of methyl bromide. The products of the burning of the methyl bromide itself were also examined.

In these experiments the conditions differed basically from those in the first method, in that the ratio of combustible to oxygen was far removed from the limit value and that burning took place partly or wholly by diffusion depending on whether primary oxygen was or was not used. In the latter respect the conditions were akin to those in an ordinary fire. In these experiments the products were almost wholly carbon dioxide, carbon monoxide, water, hydrogen bromide and bromine, the proportion varying with the conditions. Small amounts of various hydrocarbons were sometimes formed but there were no significant quantities of bromine compounds other than those indicated.

Finally, the effect of methyl bromide on the burning velocity of hydrogen and carbon monoxide, and also methane, in air had been studied using the bunsen cone method for measuring burning velocity. With hydrogen

and methane mixtures, other than those near the limit (which had not been examined), any addition of methyl bromide reduced the burning velocity and the reduction increased with further addition.

With carbon monoxide mixtures, which had a low initial burning velocity, the first addition of methyl bromide caused acceleration and a peak velocity was reached with one-two per cent of additive depending on the initial mixture.

n-Hexane in Air

Some advance had also been made at the Fire Research Station in the problem of suppression of flame by vaporising liquid extinguishers by a systematic study of the effect of a series of closely related compounds.

This was done in order to examine in more detail a phenomenon noted in an earlier study of the effect of various halogenated methanes on the inflammability limits of *n*-hexane in air. It was observed that in some instances the first small additions of a compound had a greater effect on the upper limit than that produced by subsequent additions; it was further observed that the effect was greater with compounds containing hydrogen such as methyl bromide than with the fully halogenated compounds such as carbon tetrachloride.

This effect had now been studied systematically by comparing the effects of the series of chlorinated methanes and methane itself on the inflammability limits of *n*-hexane in air. The chloromethanes were selected because all of them have a sufficiently high vapour pressure at ordinary temperatures to permit the preparation of mixtures with a wide range of compositions.

Limiting safe mixtures are shown in the following table:—

EFFECT OF METHYLENE CHLORIDE, CHLOROFORM AND CARBON TETRACHLORIDE ON INFLAMMABILITY LIMITS OF *n*-HEXANE

Diluent	Concentration of diluent in limiting safe mixtures (per cent diluent)			
	With *n*-hexane		With air	
	Volume	Weight	Volume	Weight
Methylene chloride CH_2Cl_2 ..	98.3	98	15.9	35.6
Chloroform, $CHCl_3$	87.5	91	12.0	36.5
Carbon tetrachloride, CCl_4	82.0	90	10.0	36.8

The total inhibitory effect, as assessed by the values for the limiting safe mixtures, increased with the increasing chlorine content. All the compounds, except carbon tetrachloride, reduced the lower inflammability limit when added in certain concentrations below that required for the limiting safe mixture with air, and the magnitude of this effect decreased with increasing chlorine content.

Greater effectiveness of the first small additions of diluent as compared with that of subsequent additions, was shown by all the compounds containing hydrogen but not with carbon tetrachloride. This behaviour suggested that with the halogenated methanes containing hydrogen, the effect on the lower limit was due to two different mechanisms: at low concentrations the effect was possibly predominantly chemical and specific to the particular compound tested; at higher concentrations the physical effects of dilution played an increasing part, and the effects of the different compounds did not differ to the same extent.

Recently the U.S. Army and Air Force have been responsible for extensive tests on a large number of chemical compounds for their potential use as extinguishing agents. As a result of this work it was shown that by suitable selection of hydrocarbons containing both fluorine and bromine it was possible to obtain compounds of high stability and low toxicity but with an efficiency at least as good as methyl bromide.

In view of the great interest and importance of this work arrangements had been made to assess the efficiency of some of these materials in the inflammability limit apparatus. Tests had already been made on trifluorobromomethane and tetrafluorodibromoethane, and the results confirmed the findings of the American workers. This work was being continued and the possibility of the application of these results to practice was being considered.

Paints & Flame Test

The concept of a critical radiation intensity had proved invaluable in further attempts to interpret practical tests designed to assess the relative merits of paints and other fire retardant treatments, and in considering the development of a small-scale surface spread of flame test. It had been found that freshly applied, ordinary oil paints would raise the critical intensity for surface ignition to a value at least three times that for untreated wood; the value for spontaneous ignition was usually doubled, and was not reduced in any of the paints examined.

Weathering for two years did not appear

to reduce the critical intensity for surface ignition, but that for spontaneous ignition might be reduced to the value appropriate to the untreated timber.

Application of flame-retardant paints increased the critical intensity for ignition of fibre insulating board in the presence of a pilot flame half-an-inch from the surface; Within the limits of normal rates of application the increase in thickness of the paint film did, however, increase the time required for the ignition of the treated material in the presence of radiant intensities above the critical value. The thickness of the paint film did not affect the increase in the critical intensity.

A study had been made of the ignition of textiles when subjected to heat radiation. The critical intensity for spontaneous ignition of cellulosic textiles such as cotton and linen was approximately 0.6 cal/cm²/sec.; that for pure wool approximately 1.5 cal/cm²/sec and the critical intensity for mixtures varied between these two figures.

For a wide range of cellulosic fabrics the weight per unit area of the material appeared not to affect the critical intensity for spontaneous ignition, but it did affect the time required for ignition.

Plastics Hazards

Possibility of the evolution of toxic gases, in particular phosgene, when certain plastics are involved in fire had been the subject of a number of references in the technical press.

In order to furnish advice on this subject a study had been made of the gaseous products of combustion of chlorinated methacrylate resins and polyvinyl chloride plastics. Samples of these materials were heated in a closed vessel. The conditions were varied to cover a range of temperatures from 300°C. to 1,000°C., with ratios of air to plastic ranging from 5.5 to 22 litres per gramme.

The principal products of combustion were carbon dioxide and carbon monoxide, and also hydrogen chloride. Traces of phosgene were found in one or two instances. The concentrations of the gases in the products of combustion are given in the table below, together with published data for safe tolerance limits.

Concentrations of hydrogen chloride and carbon monoxide were much greater than those considered dangerous for short exposures, whereas the concentrations of phosgene, while above the safe tolerable limit for prolonged exposure, were below the one hour limits. The phosgene was therefore relatively insignificant in comparison with the other gases. Furthermore, hydrogen chloride produces irritation at quite low concentrations and therefore its presence would be noticed and give warning that protective measures should be taken.

Ammonium Nitrate Storage

In recent years there have been several disastrous fires in which ammonium nitrate has been involved and it is, therefore, not unnatural that the hazards of this substance should attract the attention of the authorities concerned with its storage.

An experimental investigation had been made of the hazards associated with the storage of mixed fertilisers containing ammonium nitrate and calcium carbonate. The danger of nitrates was that they were able to increase the rate of burning of combustible materials such as timber because of the additional oxygen which they readily contributed.

The problem was studied, therefore, by measuring the rate of smouldering of trains of sawdust with which the mixtures of various proportions of ammonium nitrate and calcium carbonate had been thoroughly mixed. It was found that ammonium nitrate

CONCENTRATION OF TOXIC GASES FROM BURNING PLASTICS

Sample	Temperature °C.	Concentration parts per million (vol.) HCl	$COCl_2$	CO	CO_2
Chlorinated methacrylate (26.4 per cent chlorine)	350	6,300	3	not determined	
	550	6,300	5	8,000	23,500
	950	15,700	not determined	15,000	63,000
Polyvinyl chloride (56.8 per cent chlorine)	300	12,900	Nil	4,900	6,100
	600	15,300	1	6,900	14,800
	900	15,400	3	4,800	28,700
Polyvinyl chloride co-polymer (61.0 per cent chlorine)	300	13,500	Nil	2,000	4,400
	600	17,700	5	10,600	21,000
	900	17,100	10	4,700	29,000
Safe concentrations—					
Several hours		1.0	1.0	100	5,000
Dangerous at one hour		50-100	25	1,500-2,000	—
Dangerous for short exposure		1,000-2,000	50	4,000	—

—calcium carbonate mixtures containing up to 60 per cent by weight of the former salt, presented little fire hazard whereas above 70 per cent by weight the hazard increased rapidly to that of ammonium nitrate alone.

With regard to the large number of injuries and deaths caused by the ignition of clothing, a considerable effort had been devoted during the past 30 years to research on the fire retardant treatment of fabrics. Although such treatment was possible, it could not be generally applied without considerably increasing the cost of the materials.

The large oil fire which occurred at Avonmouth in 1951 focused attention on the importance of foam in protecting large oil storages. The Joint Fire Research Organisation had collaborated with the Home Office in experimental work to settle some of the problems which arose in fighting this fire. The organisation was also asked to examine samples of foam compound of a type which had caused some anxiety when stored under tropical or semi-tropical conditions.

It was found that although storage at high temperatures encouraged the formation of a sludge, the most dangerous contingency was that of even slight aeration such as might occur with a damaged container or with one in which the cap was not securely fixed.

This finding emphasised the importance of the careful supervision of the storage of these materials. It was interesting to note, however, that unfavourable storage conditions had not rendered the compound unusable.

New Refresher Courses

TWO new refresher courses for works and plant engineers are announced by the education committee of the Incorporated Plant Engineers to begin in the autumn at Glasgow and Liverpool.

Decision to initiate these further courses was taken by the committee following the success of its other refresher courses, believed to be the largest adult education series organised in the United Kingdom. In the last three years enrolments have established successive records of 233 at Bristol, 312 at Nottingham and 373 at Birmingham.

In the new courses now announced there will be a series of 20 lectures at each centre. These will be given at weekly intervals by specialists drawn from industry, and each lecture will be followed by discussion.

Subjects to be treated include: Planned maintenance; lubrication; mechanical transmission of power; combustion and steam raising; heating and ventilation; steam utilisation; distribution and utilisation of electricity; properties and treatment of metals and alloys; materials handling plant; refrigeration plant; compressed air plant; pumping plant; instrumentation of plant; the plant engineer and management.

Preliminary details of the arrangements are set out below, and members and their friends should note that brochures describing these courses will shortly be available and may be obtained either from the general secretary or from the addresses given.

Glasgow—Wednesday evenings, commencing 15 October, at The Engineering Centre, 351 Sauchiehall Street, Glasgow, C.2. Particulars from the secretary to the refresher course, at the above address.

Liverpool—Thursday evenings, commencing 16 October, at Liverpool University. Particulars from the secretary to the refresher course, 9 The Temple, 24 Dale Street, Liverpool, 2.

Exhibitions Arranged

A SERIES of exhibitions showing a selection of their newer scientific instruments and laboratory equipment has been arranged by Standley Belcher & Mason Ltd., the Birmingham associates of Griffin & Tatlock Ltd. The exhibitions will be held as follows:—

The Royal Hotel, Cardiff, 30 September, 1 and 2 October.

The Fleece Hotel, Gloucester, 7, 8 and 9 October.

The Welbeck Hotel, Nottingham, 14, 15 and 16 October.

The George Hotel, Leicester, 21, 22 and 23 October.

The Midland Hotel, Birmingham, 28, 29 and 30 October.

Opening hours each day will be from 10 a.m. to 12 noon and from 2 p.m. to 4 p.m. There will be additional sessions on the Wednesdays, 1, 8, 15, 22 and 29 October from 6 p.m. until 8 p.m.

A cordial invitation is extended to all those interested to visit the exhibitions and discuss their interests and requirements.

The International Congress of Biochemistry

By K. R. REES, M.Sc., Ph.D., Department of Biochemistry, University College, London

AT the invitation of the Société de Chimie Biologique, the Second International Congress of Biochemistry was held in Paris from 21-28 July, over 40 different countries being represented by the 2,000 delegates present. At the opening of the Congress delegates were welcomed at the Sorbonne by the President d'Honneur, M. Gabriel Bertrand, the President of the Congress, M. René Fabre, and the President of the Executive Committee, Professor Claude Fromageot.

As more than 800 original papers were presented a great deal of grouping according to context was necessary, and there were seven symposia and 31 sections. A section consisted of the presentation of a number of original communications and the symposia, in addition to original papers, were supplemented by a series of one hour lectures delivered by authorities in the respective fields. Although only 10 minutes was allowed for the presentation of each paper with five minutes for discussion, such was the volume of contributions that the symposia and many sections were carried on concurrently. Approximately 25 per cent of the original papers presented were from British laboratories, and 20 per cent were from French and American laboratories respectively.

Four General Conferences

Four general conferences were held in the Grand Amphitheatre of the Sorbonne. In the general conferences Professor J. N. Davidson (G.B.) delivered a lecture on nucleoproteins and tissue growth, Professor A. I. Oparine (U.S.S.R.) on the variation of enzyme activity under the influence of external factors in plant tissue; Professor S. Ochoa (U.S.A.) on carbon dioxide fixation in animals and plants, and Professor K. Linderstrom-Lang (Denmark) on proteins and enzymes. The lecture of Professor Oparine and the communications of the other Russian delegates were presented in Russian, but printed French translations were provided.

The subjects of the sections were: Mineral elements, lipids, amino acids and proteins, nucleoproteins, pigments, fat-soluble vitamins, water-soluble vitamins, activators of enzymes and coenzymes, glycosidases, esterases, phosphatases, and depolymerases, proteases, oxidases and dehydrogenases, carbohydrate metabolism, amino acid metabolism, sulphur metabolism, fermentations, plant biochemistry, photosynthesis, nutrition, biochemistry of bone formation, clinical chemistry, immunochemistry, blood coagulation, muscle chemistry, physiological and pharmacological chemistry, chemotherapy, biochemistry of ultrasonics, chemistry of cancer and apparatus and techniques.

The symposia presented were:—

Biochemistry of Haemopoiesis

The three years since the first International Congress of Biochemistry at Cambridge has seen very great developments in this field. By the use of isotope-tracer techniques one now has a knowledge of the precursors of all the atoms of the haem nucleus. Investigations in this field have established in biochemistry the concept of the importance of small molecules in biosynthesis, e.g., acetate. H. Wijmenga reviewed three years of chemical investigations on the vitamin B_{12} group and M. Shorb, Y. Kung and W. Scott considered factors influencing the microbiological assay of vitamin B_{12}.

It appeared from papers presented in this section that workers were now turning their attention to the enzymes concerned with haem synthesis. J. Falk and E. Dresel (G.B.) and I. London (U.S.A.) reported the demonstration of the biosynthesis of haem in cell-free systems. The former workers used haemolysed fowl erythrocytes as their enzyme source. Fractionation studies are in progress to determine the cellular constituents concerned with haem synthesis. So far it has not been possible in *in vitro* systems to demonstrate a vitamin B_{12} effect on the synthesis of haem. A number of investigations of the *in vivo* metabolism of vitamin B_{12} were reported. Lester-Smith and his co-workers (G.B.) reported on meta-

bolic studies with radioactive vitamin B_{12}, labelled in the cobalt. It was found that the proportion of injected vitamin B_{12} that was eliminated in the urine of normal or B_{12} deficient rats or humans is small with physiological doses but increased with the size of the dose. Ungley and co-workers (G.B.) also presented evidence on the absorption, transport and utilisation of vitamin B_{12}.

Biogenesis of Proteins

Studies on the biogenesis of proteins have contributed a great deal to our present knowledge of the dynamic state of body constituents. This aspect of the field was considered in D. Rittenberg's report on the dynamic state of tissue proteins. As yet there is very little information of the enzymes concerned with the biosynthesis of proteins. Useful studies in this direction have been those on peptide bond formation and J. S. Fruton reviewed this subject in his lecture on the enzymatic synthesis of peptide bonds.

A. Albanese (U.S.A.), reported that in diets lacking the essential amino acid lysine a normal rate of plasma protein synthesis was maintained in the human organism. Chemical analysis disclosed, however, that a substitution of arginine for lysine had occurred in these proteins. Addition of lysine to the diet resulted in a normal state in 16 to 21 days. This work suggests that these circulatory proteins are regenerated completely within this time and that their configurations are not immutable. Investigations of W. Robertson (U.S.A.) disclosed that in the formation of collagen a deficiency of vitamin C resulted in decreased synthesis. Addition of cortisone usually decreased collagen formation.

The Tricarboxylic Acid Cycle

Many of the advances in this field of work during the last three years have resulted from studies on organised enzyme systems, such as the mitochondrion. D. Green reviewed these recent advances and the present knowledge of the intracellular localisation of the tricarboxylic acid cycle enzymes, in his lecture on the cyclophorase-mitochondrial system. In the higher organism the tricarboxylic cycle functions mainly as a pathway for the production of energy with a subsidiary function of synthesis of special carbon chains. H. Krebs lectured on 'The place of the tricarboxylic acid cycle in cell metabolism' and considered the possibilities of such a dual function at lower levels of organisation.

A large number of papers in this symposium were reports of investigations of the mechanism of oxidative phosphorylation and the effect of salt solutions on the enzymatic activity of the mitochondria. J. Raaflaub (Switzerland) investigated the swelling of isolated mitochondria of rat liver and its inhibition. It has been found that among the usual components of the incubation-cations, e.g., Mg.++ inhibit or delay swelling, as well as other bivalent anions such as succinate, α-ketoglutarate, etc. On the other hand adenosine triphosphate and bivalent cations, e.g., Mg.++ inhibit or delay swelling. The author concluded that the function of adenosine triphosphate and Mg.++ as cofactors of oxidation is to keep the tight structure of the mitochondria intact. Ernster and Lindberg (Sweden) studying mitochondrial-hexokinase reactions presented evidence that the working mitochondria activate the added hexokinase.

A number of workers had investigated the oxidation of α-ketoglutarate and the associated phosphorylations, e.g., E. Slater and F. Holton (G.B.). It now appears established that CoA is an essential co-factor for the oxidation of α-ketoglutaric acid with succinyl-CoA as an intermediate. The localisation of tricarboxylic acid cycle enzymes in the mitochondria of brain and factors aiding in the stability of respiration of these particles were reported by J. Judah, K. Rees and G. Christie (G.B.). Evidence was put forward by Y. Yamamura and S. Akabori (Japan) of tricarboxylic acid cycle activity in *Mycobacterium Tuberculosis avium*.

It had been observed that cyclophorase preparations from diphtheria-intoxicated guinea pigs had reduced tricarboxylic acid cycle activity. Investigations by Hoffmann-Ostenhof and co-workers (Austria) of *in vitro* additions of toxin to cyclophorase preparations of non-infected animals had failed to elicit a depression in cycle activity.

Protein Hormones and Hormones Derived from Proteins

Reviews in this section were given by F. G. Young on pituitary growth hormone and its metabolic influence, R. Michel on the biochemistry of thyroxine. Reports were published by V. du Vigneaud on studies on

the oxytocic and pressor hormones of the posterior pituitary and by C. H. Li on recent knowledge of hypophyseal growth and adrenocorticotropic hormones.

It is generally believed that hormones operate by having an action on enzyme systems. Thus the paper by C. Martius (Germany) was a notable contribution in this section. Martius reported the demonstration of an *in vitro* effect of thyroxine uncoupling oxidative phosphorylation, by a pre-incubation of the mitochondria with the hormone. J. Cross and R. Pitt-Rivers (G.B.) reported the isolation of 3 : 3′ : 5′-triiodothyronine from thyroid tissue. This substance has been found to be several times more active than thyroxine (3 : 5 : 3′ : 5′-tetraiodothyronine.) The triiodo derivative is also found in plasma. The synthesis of this substance was reported.

There were a number of papers presented on ACTH (adrenocorticotropic hormone). Information on the extraction and purification of ACTH was given by G. Martin (France). This worker had compared existent methods and presented a new method with procedures for increasing activity.

Metabolism of Micro-organisms

Studies on the metabolism of micro-organisms have aided in our knowledge of the biosynthesis of complex molecules, e.g., CoA, which are universally essential. E. E. Snell discussed correlations of chemical, enzymatic and growth promoting properties of vitamin B_6, and D. D. Woods reviewed the function in microbial metabolism of folic acid, vitamin B_{12} and related growth factors.

E. Evans (U.S.A.) presented some biochemical studies on bacterial viruses. It did not appear that the materials of the bacterial host are used to any large degree in a specific manner for the synthesis of viral progeny. This data is in harmony with the view that viral replication involves a distortion by parasitism of the normal metabolic characteristics of the bacterial host.

A number of papers were presented on the biosynthetic activity of micro-organisms, e.g. A. Fairhurst, H. King and C. Sewell (G.B.) described alanine synthesis by washed suspensions of *Bacillus subtilis* from pyruvate and ammonia. This synthesis only occurs with actively growing cells.

W. Pierpoint and D. Hughes (G.B.) investigated the synthesis of CoA by *Lactobacillus arabinosus* 17.5. With pantothenic-deficient organisms and additions of pantothenic acid and glucose, some CoA synthesis occurred. The yield of CoA was increased by ten to a hundred times by the addition of cystine or cysteine to the medium. It was found that glutathione would replace the action of cystine or cysteine.

Mode of Action of Antibiotics

One of the major lines of investigation in this field is the effect of antibiotics at the biochemical level. Reviews given by E. Gale, L. Massart and W. Umbreit considered possible modes of action of various antibiotics. Papers presented in this section reported further investigations along these lines. D. Hughes (G.B.) presented information of the mechanism of the inhibition of growth and cozymase formation in bacteria by 5-fluoronicotinic acid. It was found that such inhibition was competitive and was reversed by nicotinic acid. It was suggested that fluoronicotinic acid enters into the synthetic pathway where it blocks the utilisation of nicotinic acid derivatives.

N. Nielsen (Sweden) studied the influence of different carbohydrates on the growth, respiration and penicillin formation of *Penicillium chrysobenum.* It was found that maximum penicillin formation was obtained with lactose in the substrate. Fairly good yields were obtained with cellobiose, fructose and glycerol. Low yields were obtained in other media. One of the disadvantages of the widely used culture of *Penicillium chrysogenum Q 176* is that it secretes yellow pigments which interfere with the making of crystalline penicillin. W. Peterson (U.S.A.) reported on the production of mutants which contain no pigments. Semi-scale investigations on penicillin production with these mutants are under way.

Biochemistry of Steroids

The application of isotope-tracer techniques, in the last three years in this field, has given information of the precursors for the biosynthesis of the steriod nucleus. G. Pincus reviewed the present knowledge of the biosynthesis of steroid compounds. A more chemical note was the review by C. W. Shoppee on the structure and shape of steroid molecules in relation to biological activity. Papers presented in the symposium dealt with the metabolism and biosynthesis of the steroids.

It has been established that acetate is one

of the precursors of cholesterol. Acetylation reactions, e.g., the acetylation of choline, etc., have been shown to require CoA as a co-factor. G. Boyd (G.B.) investigated whether CoA was necessary for the synthesis of cholesterol. It appears however that the intermediate products of fat metabolism may be utilised directly for cholesterol synthesis without undergoing complete degradation to acetate units.

R. Kapeller-Adler (G.B.) reported on the effects of sex hormones and related substances on the activity of histaminase. It has been reported that natural oestrogens greatly activated histaminase. The synthetic oestrogens, e.g., stilboesterol, depressed histaminase activity. Histaminase activity was also greatly depressed in the presence of androgens.

Muscle Biochemistry

One of the most interesting sections was that on the biochemistry of muscle. L. Stark (U.S.A.) presented data on force-velocity relationships of actomyosin fibres. Because of the organisation of these synthetic fibres in a monomolecular layer they are able to shorten and do mechanical work when adenosine triphosphate is added. This worker is to be congratulated, in that for the first time the gap between muscle physiology and biochemistry appears to be bridged. Other communications discussed adenosine triphosphate actomyosin reactions, physical chemistry of protein, oxidation systems of skeletal muscle granules and changes in stratified muscle. A report was presented by Professor Engalhardt (U.S.S.R.) on the enzymology of myosin, which was related to some of the more interesting shorter communications.

Social Arrangements

A number of social events were arranged during the week. A reception was given on the evening of the first day at the Hôtel de Ville by the Président, P. Coirre, and the Municipal council of Paris. Visits were made to the Opera, to the Louvre, and there were excursions to Chantilly and Versailles. A series of banquets, one for each symposium, were held during the evenings. It was possible also to visit research and industrial organisations, e.g., Institut Pasteur à Garches.

It was decided during the course of the Congress to hold the Third International Congress of Biochemistry at Brussels in 1955.

Leather Trades' Chemists

THE annual conference of the Society of Leather Trades' Chemists will be held in the large chemistry lecture theatre, Leeds University, on Friday and Saturday, 19 and 20 September.

'Intrinsic Properties which Make Leather So Unique' will be the subject of a discussion at which Dr. R. W. Lunt (Imperial Chemical Industries, Ltd.), Dr. H. Phillips (director, BLMRA), Dr. R. G. Mitton (physicist, BLMRA), and Mr. F. Q. Quinn, M.Sc., have promised to take a leading part.

This will be followed by a paper 'Surface Films: A New Approach to the Mechanism of Tanning Reactions,' by Dr. K. G. A. Pankhurst, F.R.I.C., and Dr. S. C. Ellis, A.R.I.C. (BLMRA).

On Friday afternoon the annual general meeting of the society will be preceded by delivery of the Fifth Procter Memorial Lecture. The speaker will be Dr. J. B. Speakman, Professor of Textile Industries, University of Leeds, who will survey 'The Reactivity of Protein Fibres: Some Analogies between Keratin and Collagen.'

The first day's proceedings will conclude with a reception at 5.30 p.m. given by the Yorkshire Dyeware and Chemical Co., Ltd., at the Metropole Hotel and a dinner at the Refectory.

At the final session on Saturday morning there will be two papers. The first will be by Mr. William I. Stephen, A.R.I.C., B.Sc., department of chemistry, Birmingham University, on 'Some Applications of Microchemistry' and in the second Dr. D. Burton, F.R.I.C., and Dr. R. Reed, will discuss 'Modern Views on the Architecture of the Collagen Fibrils of Pelt.'

Canadian Refinery Expansion

EXPANSION of its refinery facilities at Vancouver at a cost of $10,000,000 has been announced by the Shell Oil Company of Canada. The programme will begin in the autumn and is scheduled for completion late in 1953. Capacity will be more than doubled to 15,000 barrels a day. Hope of dovetailing the expansion with the completion of the trans-mountain oil pipeline from Edmonton to Vancouver, in which Shell possesses a large interest was expressed by the president, Mr. W. M. V. Ash.

Chemistry of Cement

Third International Symposium

MANY interesting papers will be read and discussed at the Third International Symposium on the Chemistry of Cement which will be held in London next month.

Attendance will be by invitations only, these having been sent out mainly on the recommendations of the building research departments of various Governments and cement and concrete associations. Delegates will include representatives from Canada, Denmark, France, Germany, Italy, Switzerland and the U.S.A.

The symposium will be held from Monday 15 to Friday 19 September in five sessions. The first will be held at the Royal Institution, Albemarle Street, W.1, while the remainder will be at the Royal Society of Arts, John Adam Street, Adelphi, W.C.2.

Proceedings will be opened on Monday afternoon by addresses of welcome from Sir Ben Lockspeiser, M.I.Mech.E., F.R.Ae.S., F.R.S., secretary, DSIR and president of the symposium, and Sir Francis Meynell, R.D.I., director, Cement and Concrete Association and vice-president.

Introductory addresses will follow by Dr. A. Allan Bates, vice-president, Portland Cement Association, U.S.A., and Professor H. Lafuna, director, Centre d'Etudes et de Recherches de l'Industrie des Liants Hydraulique France. To conclude the first session, P. Gooding, A.M.I.Struc.E., development and information officer, Cement and Concrete Association and organising secretary of the symposium, and Dr. P. E. Halstead, head of the chemistry and physics section of the Research and Development Division, Cement and Concrete Association, will give a paper, to be followed by discussion, on 'The Early History of Portland Cement in England.'

Rest of Programme

The remainder of the programme is as follows:—

Tuesday, 16 *September—Session* 2.

The Constitution of Portland Cement will be discussed in its various phases by speakers from the U.K., U.S.A., and Italy.

Wednesday, 17 *September—Session* 3.

This session will be devoted to discussion and papers on The Setting and Hardening of Portland Cement by delegates from Canada, the U.K., and the U.S.A.

Thursday, 18 *September—Session* 4.

Special cements will be the subject of papers from British, French, German and American contributors. In the afternoon a visit has been arranged to the Building Research Station, at Garston, Watford, Herts.

Friday, 19 *September—Session* 5.

Speakers from Switzerland, Denmark, the United Kingdom and U.S.A. will take part in the final session on Applications of Research, while the closing address will be delivered by F. M. Lea, C.B.E., D.Sc., F.R.I.C., hon. A.R.I.B.A., director, Building Research Station on 'Cement Research and the Future.' The Research Station of the Cement and Concrete Association, Wexham Springs, Stoke Poges, will be visited in the afternoon.

A number of social events have been arranged for the evenings, details of which will be announced later. These include a Government reception (Monday), a banquet given by the Cement and Concrete Association (Wednesday) and a conversazione.

New Sulphur Plant in Canada

A CANADIAN project to help in overcoming the shortage of sulphur is being worked on at two mills of the Abitibi Power and Paper Co., at Port Arthur and Sault Ste. Marie.

Construction is in progress at Port Arthur of a plant for the extraction of sulphur from iron pyrites. An estimated production of sulphur dioxide equivalent to 10 tons of sulphur a day is expected when the plant comes into operation in the autumn.

At Sault Ste. Marie, the method proposed is to use liquid sulphur dioxide which will be produced in a new plant being built at Copper Cliff, Ont., by Canadian Industries Ltd. This plant, which will utilise what have formerly been regarded as waste gases from International Nickel Co.'s flash smelting process, is expected to get started in mid-October. Canadian International Paper Co. is also expected to use liquid SO_2 from this plant.

Tanks for storing the liquid SO_2 have already been installed by Abitibi at its Sault plant and the mill equipment is at the same time being revamped to use the liquid. The mill will, however, be left so that it can swing back to the burning of sulphur if that should be found desirable.

Exemptions List Amended

Wide Range of Products Deleted

THE Treasury has made an Order under Section 10(5) of the Finance Act, 1926, continuing from 19 August, 1952, until 18 February, 1953, the exemption from Key Industry Duty of all the articles exempted from that duty by previous Orders which expire on 18 August, 1952, with the addition of:

*mono*acetylacetone, 2-*mono*aminoethyl alcohol, 3-aminophenol, β-*mono*aminopropionic acid, *iso*bornyl *mono*thiocyanatoacetate, calcium 2-iodoxybenzoate, 3-chloroaniline, 1-*mono*chloro-2: 3-epoxypropane, *mono*cyanoacetic acid, *mono*cyclohexylamine, α-dichlorohydrin, dicyclohexyl *ortho*phthalate, 2-*mono*diethylaminoethyl alcohol, 2-*mono*diethylaminoethyl diphenylacetate hydrochloride, di-(2-methylcyclohexyl) *ortho*phthalate, di-(3-methylcyclohexyl) *ortho*phthalate, di-(4-methylcyclohexyl) *ortho*phthalate, *n*-dodecyl alcohol, *mono*ethylbenzene, ethyl 2-benzoylbenzoate, ethylene *mono*chlorohydrin, α-ethyl-*n*-hexoic acid, ethyl α-hydroxy-α-methyl-*n*-butyrate, germanium dioxide, *n*-heptoic acid, 3-hydroxyacetophenone, *l*-malic acid, menthyl *mono*ethoxyacetate, *d*-methionine, *l*-methionine, *dl*-methionine, methyl *mono*cyanoacetate, *N*-*mono*phenyl-2-naphthylamine, potassium guaiacol *mono*sulphonate, *mono*-*iso*propylamine, safrole (not including *iso*safrole), R.*n*-stearic acid, strontium 2-ethylhexoate, R. titanium dioxide, 2: 4-xylenol, 3: 5-xylenol, 2: 6-xylidine and 3: 4-xylidine.

The following are deleted:

Acenaphthene, 2-(*p*-acetoamidobenzenesulphonamido)-pyrimidine, acetone (fermentation), acetone (synthetic), acetylacetone, aluminium chloride (anhydrous), 2-aminoethyl alcohol, *m*-aminophenol, *p*-aminophenol, β-aminopropionic acid, *o*-anisidine, *iso*-bornyl thiocyanoacetate, *sec*-butyl alcohol, *tert*-butyl alcohol, calcium, *o*-iodoxybenzoate, carbon disulphide, carbon tetrachloride, *m*-chloroaniline, *mono*chlorobenzene, *o*-chloro*mono*nitrobenzene, *p*-chloromononitrobenzene, *o*-cresol, cyanoacetic acid, cyclohexanol, cyclohexylamine, diacetone alcohol, *p*-dichlorobenzene, dichlorodiphenyltrichloroethane, dichlorohydrin, dicyclohexyl phthalate, diethylamine, diethylaminoethyl alcohol, 2-diethylaminoethyl diphenylacetate hydrochloride, diethyl phthalate, dimethylamine, di-methylcyclohexyl phthalate, dimethyl phthalate, diphenyl, diphenylamine, dodecyl alcohol, epichlorhydrin, ethylbenzene, ethyl benzoylbenzoate, ethylene chlorohydrin, α-ethylhexyl acid, 2-ethylhexyl alcohol, ethyl α-hydroxy-α-methylbutyrate, germanium oxide, guanidine nitrate, guanine, heptoic acid, *m*-hydroxyacetophenone, lactic acid, lauroyl chloride, *l*-malic acid, menthyl ethoxyacetate.

dl-Methionine, (+) methionine, (−) methionine, *p*-methylaminophenol sulphate, methyl cyanoacetate (a methyl ester), methylcyclohexanol, methylcyclohexanone, methylene dichloride, methyl methacrylate, 2-methyl-2: 4-pentanediol, 1-naphthol, 2-naphthol, *p*-nitroaniline, *p*-nitrobenzoic acid, 2-nitrodiphenylamine, *p*-nitrophenol, *p*-nitrotoluene, *n*-octoic acid, paraformaldehyde, *o*-phenetidine, *p*-phenetidine, R.phenol, phenol (synthetic), phenolphthalein, phenyl-2-naphthylamine, phthalic anhydride, potassium guaiacolsulphonate, potassium metabisulphite, *iso*propylamine, quinoline, safrole, *di*-sodium dihydrogen pyrophosphate, *tri*sodium naphthalene-1: 6-trisulphonate, R. stearic acid, sulphaquinoxaline, tetrachloroethylene, R. titanium oxide, toluene-*p*-sulphonamide, *o*-toluidine, *p*-toluidine, 2: 4: 6-tribromophenol, trichloroethylene, tricresyl phosphate, triethanolamine, *m*-4-xylenol, *m*-5-xylenol, *m*-2-xylidine, *o*-4-xylidine and zinc ethylene*bis*dithiocarbamate.

The Order is the Safeguarding of Industries (Exemption) (No. 5) Order, 1952, and is published as Statutory Instrument 1952.

U.K. Radioactive Compounds

PERMISSION for British radioactive compounds to be sold in the U.S.A. was announced in London on 18 August. Under the agreement, negotiated by the Ministry of Supply, sale of the compounds in America will be promoted by the Nuclear Instrument and Chemical Corporation of Chicago.

It is expected that the radioactive compounds which are prepared at the radiochemical centre at Amersham will be in considerable demand. According to a Ministry spokesman these compounds are so diverse and numerous that no single country can produce all the types required for their various purposes.

A highly qualified team of scientists at Amersham has for some years been at work on developing these products.

U.S. Equipment for British Research

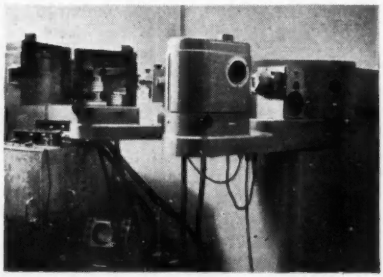
A SELECTIVE list of more than £350,000 worth of new scientific equipment, supplied recently by the American Government to British research laboratories working to develop better and cheaper industrial and consumer goods and to find new uses for waste products, was released on Monday, 18 August, by William L. Batt, Minister in charge of the Mutual Security Agency mission to the United Kingdom.

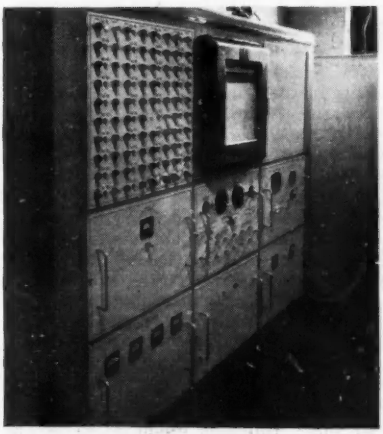
The equipment, much of it obtainable only in the United States, was ordered and made available under the technical assistance programme of the Marshall Plan, which has been succeeded by the Mutual Security Programme. While much of the equipment has gone to the British Government's Department of Scientific and Industrial Research, 24 other research bodies throughout the United Kingdom have also received many of the instruments. Compiling the list of equipment required, and screening requests from research organisations representing every major British industry, was carried out by the DSIR.

Both the British Cast Iron and the British Non-Ferrous Metals Research Associations receive multi-channel direct reading spectographs, of which it has been said that in scope, speed, and accuracy, such equipment allows methods to be used that represent a major advance on any existing rapid analytical technique. This multi-channel equipment is manufactured only in the U.S.A.

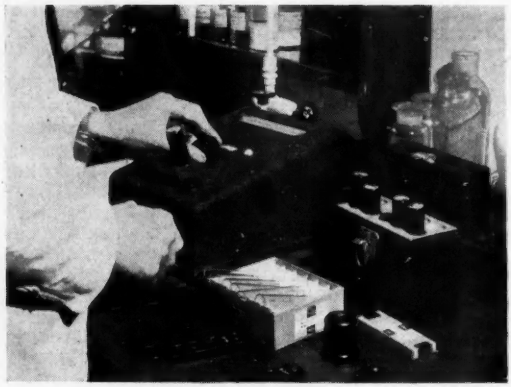
The Non-Ferrous Metals Association's equipment incorporates certain modifications to its own design. The equipment includes a quantometer, a 1½ metre grating spectrograph with recording console and an auxiliary grating spectrograph (Applied Research Laboratories, Glendale, California). The quantometer is being used for the development of spectrographic methods of analysis for copper and complex copper alloys—an investigation which has not been carried out before as a continuous piece of research. The programme includes determination of impurities in unalloyed copper; determination of impurities and major and minor constituents in brasses, determination of minor constituents in gun metal, as typical of the more complex alloys—a research which has given difficulties in the past four years; and a comparison of the direct reading method with photographic methods.

The grating spectrograph, with camera, has facilities for a direct reading attachment. When developed, it will use the recording console of the quantometer. A feature is





The British Non-Ferrous Metals Research Association received a production control quantometer (right) and (above) a grating spectrograph, with camera



This photo-nephelometer for quantitative determination of the turbidity of solutions

that it has two excitation stands and can thus obtain 1st and 2nd order spectra in the same position. It will be used, among other purposes,. to develop methods of analysing copper for its selenium and tellurium content.

Another instrument which the Cast Iron Research Association has received is a high temperature dilatometer (Harry W. Dietart Co., Detroit), for research into moulding sands. Briefly, the instrument will be employed to study the basic rheological properties of moulding materials at room and elevated temperatures, the latter being the more important. It is hoped that this apparatus will help to solve the problem generally known as 'scabbing', which is caused by the penetration by the molten metal of the mould face.

The Welding Research Association has received a model F.B. Tukon Tester and accessories (Wilson Mechanical Instrument Co. Inc., New York). This test equipment is fully automatic for determination of Knoop Hardness Numbers and 136° diamond pyramid hardness numbers under testing loads of from 25 to 3,600 grms. It will be used for specialised research on the welding characteristics of high tensile steel.

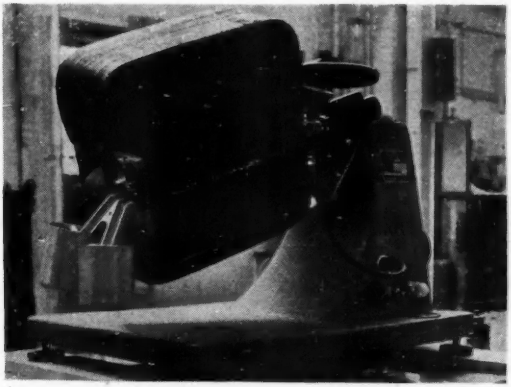
The Fuel Research Station of DSIR, in common with the Chemical Research Laboratory has received Hyd-Robot automatic low temperature fractional analysis apparatus and accessories (Podbielniak Inc., Chicago).

The FRS also receives a centrifugal molecular still (Distillation Products Inc., Rochester), for determining the composition of certain of the products from the synthesis of oil from coal by the Fischer-Tropsch and other processes, oils from the carbonisation of coal, and waxes from indigenous peats and lignites.

Other work will be much simplified by a Brabender semi-automatic moisture tester (Brabender Corpn., Rochelle Park, New Jersey). This is being used to determine the moisture content of coal samples and can finish a complete test in the time it took to weigh a sample by previous methods. The instrument takes 10 specimens at a time, and operation is extremely simple.

A small item of equipment— a disc of material 7 in. diameter and 1 1/16 in. thick (Micro Metallic Corporation, New York), will materially assist the Gas Research Board in furthering a technique it has developed for gasifying coal. The technique involves the use of a fluidised bed of coal particles. It is necessary to remove fine particles of coal from the gas stream. One method of overcoming this difficulty depends on the use of a sintered metal disc which is porous to gas. Since the temperature of conversion exceeds 900°C., the metal must have a melting point well above this. Suitable metals were not available in Britain, so this disc has been provided from the U.S.A.

The Chemical Research Laboratory has been allocated a variety of equipment. Of particular interest is a complete Podbielniak Hyd-Robot low temperature still (Podbielniak Inc., Chicago). This equipment is being used at present for the preparation of



and an isodynamic separator were received by the Chemical Research Laboratory

highly purified samples of gaseous hydrocarbons for distribution to industrial and academic laboratories as mass-spectrometric standards.

The CRL is also scheduled to receive a Beckman spectrophotometer with ultraviolet accessory set (National Technical Laboratories, South Pasadena, California), for accurate analytical work, and the Hyd-Robot will also find further application for the isolation of organic compounds, in investigating the use of indigenous raw materials as sources of industrially important organic substances. In addition a type G-2 Mueller bridge (Leeds & Northrup Co., Philadelphia) will be used for different analytical techniques as part of the same programmes of research. Analytical work will be carried out at various stages on the purification of chemicals from their raw materials or of the synthesis of complex organic compounds from simpler intermediate compounds. In reactions where the product depends critically on the operating temperature, the Mueller bridge will provide the essential fine control of temperature.

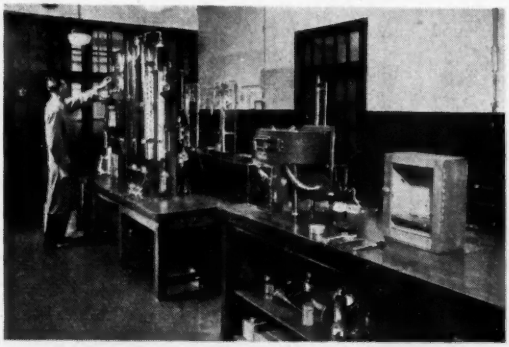
Another unit with special qualities is a low-voltage multi-source unit (Applied Research Laboratories, Glendale, California). The spectral sensitivities of different elements vary according to the nature of the method of excitation, some exhibiting their greatest sensitivities under arc-like and others under spark-like conditions. This unit, by providing a rapid and flexible change from one extreme to the other, has enabled the laboratory to establish rapidly the most favourable type of discharge for a given analytical problem and to select for analysis those lines giving the greatest reproducibility. Furthermore, the maximum power obtainable by its use is much greater than that of any unit available in Britain.

Important work has been carried out in relation to raw materials of interest in Atomic Energy, as a result of applying a Frantz isodynamic separator received under the programme (S. G. Frantz & Co. Inc., Trenton, New Jersey). Previously no equivalent laboratory magnetic separator has been available for this important work. The equipment is employed for the separation of minerals by utilising the different magnetic properties of these materials.

A photo-nephelometer (Coleman Instruments Inc., Maywood, Ill.) is used for the quantitative determination of the turbidity of solutions, and is proving particularly valuable for the determination of trace quantities of metal compounds arising from analytical work, with particular application to minerals and ores. The estimation of trace quantities of thorium as iodate is one example of the use to which the apparatus has already been applied.

One major project of the laboratory is the study of high polymers, particularly those possessing ion exchange properties. A supply of divinyl benzene has been provided to assist research on ion-exchange resins.

A small high pressure pilot plant for catalytic flow-through experiments (American Instrument Co., Maryland) will be used to investigate the synthesis of industrially important chemicals from cheap and readily available raw materials. In particular, this



The Laboratories of the Fuel Research Station (left) have been equipped with a Brabender moisture tester while the Hyd-Robot automatic low temperature fractional apparatus shown below was allocated to the Chemical Research Laboratory for preparation of highly purified samples of gaseous hydrocarbons

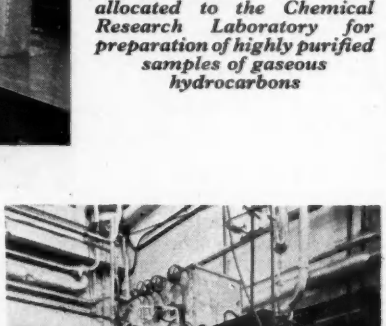
apparatus will study the fully-hydrogenated hydrocarbons which find use in industry as lubricants, waxes, etc.; and, in particular, the behaviour of catalysts in these reactions will be investigated.

The British Food Manufacturing Industries Research Association has received a Waring blender, for the rapid preparation of samples for analysis, a 'Sagometer' jelly tester to enable it to compare figures with U.S., organisations using the same instrument, and a recording viscometer for starches which, once again, will allow direct comparison in its own field with results obtained in the U.S.; and Howard mould count slides.

The Pest Infestation Laboratory will use American methyl bromide applicators to assist in work on the storage of grain and other products, the work involving investigation into the use of fumigants as a control of pests causing deterioration and also the effects on foodstuffs of the use of fumigants as a pest control.

The Leather Manufacturers' Research Association will be provided with a Beckman ultra-violet spectrophotometer for the analysis and general examination of chrome tan liquors, and Theis shrinkage test apparatus for assessing the quality of limed pelt.

The Research Association of British Paint, Colour, and Varnish Manufacturers will receive equipment to modernise an existing Perkin-Elmer spectrograph; a set of diffraction reference cards; and an instrument for mixing pigments and various media under automatic conditions and determining the



ease with which mixing takes place in terms of the power consumption of the apparatus; a Taber abraser for studying the mechanical and wear-resistant properties of films; and specular gloss standards. Also scheduled is a high speed microtome, produced by the Custom Scientific Instruments Inc., Arlington, New Jersey, which is for cutting sections of paint films and other specimens. This equipment will facilitate the study of stratification which occurs in paint films and other phenomena such as pigment separation and flotation in such films, the prepared specimens being subsequently examined, for example, in the electron microscope.

Sulphur Supply Survey

OEEC Warns Against Relaxation of Effort

VIGOROUS action is necessary if the sulphur supply situation is to be overcome, this is the main conclusion emphasised in 'Sulphur,' a study by the secretariat of the Chemical Products Committee published by the Organisation for European Economic Co-operation.

OEEC was constituted in Paris, in April, 1948, its members comprising Austria, Belgium, Denmark, France, Germany, Greece, Iceland, Ireland, Italy, Luxemburg, the Netherlands, Norway, Portugal, Sweden, Switzerland, Trieste, Turkey, and the United Kingdom. Canada and the U.S.A., although not members, participate in the work.

The problem of sulphur has been under study in the organisation since its inception. A number of surveys of the long-term trends and the measures to be taken to alleviate a threatening shortage have been prepared by the Chemical Products Committee and its secretariat, but in general no serious consideration was given to their conclusions until the crisis following the Korean war created a real shortage and thus forced governments to give their attention to this problem.

Since then, the long-term view seems to have been somewhat obscured following the establishment of the International Materials Conference in Washington and the adoption of a system for periodic allocations of sulphur.

Greater Optimism

Moreover, a more optimistic view seems to have gained prevalence since the reports about the discovery of new domes in Louisiana and probable increases in production. There is a danger that prospects may be exaggerated and that the efforts to develop European resources by recovery or substitution may be relaxed.

These are the reasons which have led to the production of the present survey. The two main objects are to show the necessity of taking vigorous steps to eliminate the sulphur bottleneck and to show how this may be done.

Since the beginning of the sulphur shortage in the second half of 1950, some countries have made, and are still making, great efforts to recover the element wherever this can be achieved in a sufficiently economic manner.

Owing to the inevitable delay in the construction of plant the benefit of these efforts has not yet been realised, but it is possible to form some idea of the results which may be obtained in 1954-55.

It may be estimated that in member countries as a whole, some 300,000 tons of sulphur will be recovered in the form of elemental sulphur in 1954-55, partly from pyrites (125,000 tons), partly from oil refineries (56,000 tons), from shale-oil (25,000 tons) and partly from coal (76,000 tons).

In Two Parts

The report is divided into two parts, the first dealing with sulphur, and the second with sulphuric acid.

An estimated balance sheet of the element in 1955 opens part one, and this is followed by a survey of the total possibilities of sulphur recovery and an economic study of recuperation.

In the OEEC countries requirements of elemental sulphur in 1955 are estimated at 1,005,000 tons. Production is anticipated at 700,000 tons (395,000 tons of native and 305,000 tons of recuperated sulphur). This with an allowance of 50,000 tons for export of sulphur to non-member countries leaves a net deficit of 355,000 tons.

Requirements of elemental sulphur in the U.S.A. are expected to be 6,400,000 tons, exceeding the production of native and recovered sulphur by 400,000 tons.

Additional possibilities of recuperation in OEEC countries are estimated at 134,000 tons of which it is considered 44,000 tons could be recuperated from crude oil and the remaining 90,000 tons would be a practical recuperation from a possible potential recovery of 264,000 tons from coal.

The second part of the report gives an estimated pyrites balance sheet in 1955, and then studies the possibility of economies in the use of sulphuric acid, with special emphasis on the need for exploring various processes in fertiliser production, which on its own accounts for more than half of all the sulphuric acid used by member countries.

General conclusions of the report show that the problem of sulphurous materials sub-divides into two separate problems which only partly affect one another; consequently, steps must be taken simultaneously in these two fields, that is, that of sulphur as such, and that of pyrites.

Suggested Remedies

Net deficit of the member countries of the element may be remedied, at least partly, by efforts along the following lines:—

(a) Increase in the production of native sulphur, the limits of which are set by European geological conditions.

(b) Intensification of conversions, chiefly for the production of sulphuric acid: but any effort in this direction increases simultaneously the deficit in pyrites, the utilisation of anhydrite or gypsum being limited in particular, by considerations of energy supplies and the disposal of by-products.

(c) Increased recuperation from crude oil and coal gas by the full use of possibilities that allow of reasonable economic conditions.

It has been seen that, for 1955, even if all these efforts were pursued to the maximum, there would still be a net deficit of more than 200,000 tons. In addition, their practical application would require very considerable investments.

It should, moreover, be emphasised that the net European deficit is in fact only a purely marginal quantity in relation to United States consumption of elemental sulphur, and that, consequently any reduction in United States consumption, even if only a slight one, would release enough sulphur to meet the residual requirements of the member countries.

Owing, on the one hand, to an increase in requirements of sulphuric acid and on the other to the need to reduce production of this acid from elemental sulphur, by 1955 member countries will have become much more dependent on the rest of the world. Thus the 64 per cent of consumption covered by home production in 1951 will probably be reduced to about 50 per cent by 1955.

There is little likelihood of non-member countries, in particular Spain, being able to meet this increased demand. It will therefore be necessary to reduce the production of sulphuric acid, and, consequently, to economise on its use.

To become fully effective, this saving should bear on the sector which consumes the most acid, that is on fertilisers. Furthermore, in order not to jeopardise economic expansion in the field of agriculture, this result can only be achieved by producing types of fertilisers which use less or no sulphuric acid.

A whole series of processes can be employed, the use of which would completely solve this problem without creating any serious dsturbances.

It may be added that the use of these processes in the United States even on a small scale, would enable that country to reduce its consumption of sulphuric acid and, with it, its consumption of elemental sulphur to an extent compatible with the requirements of member countries.

Britain Biggest Supplier

BRITAIN was the biggest single source of U.S. imports of coal-tar products last year, supplying 2,000,000 lb., worth $533,000 (about £190,000), out of imports totalling 8,500,000 lb., worth $2,200,000, the U.S. Tariff Commission has announced.

German supplies of these products to the United States totalled 2,900,000 lb. last year, but they were worth only $365,000 or about £130,000. Lesser quantities also came from Canada, Belgium, Holland, Japan, Switzerland, Czechoslovakia, Australia, France, Sweden, Italy, Mexico, and Norway.

United States imports of 1,000,000 lb. of aniline in 1951 all came from Britain and Canada, said the report, while Britain was the chief source of imports of *o*-cresol, which totalled 778,000 lb.

As in previous years, dyes were by far the most important group of finished coal-tar products, accounting for 4,200,000 lb.

In 1951, for the first time since the war, Germany was one of the main sources of U.S. dye imports, with Switzerland second.

The next largest group of finished synthetic coal-tar products imported in 1951 was medicinal and pharmaceutical goods.

Imports of coal-tar flavouring and perfume materials were down from 33,817 lb. in 1950 to 20,640 lb. in 1951. Imports of all other finished coal-tar products declined from 3,100,000 lb. in 1950 to 920,000 lb. in 1951. This decline was caused by the discontinuation of all imports of explosives in 1951.—B.U.P.

German Production Decline Halted

Basic Chemicals Output Levels Out

THE decline of German chemical production in evidence since the end of last year came to an end during July in at least one important field, that of basic chemicals. The sulphuric acid output of 115,000 tons (SO_3) was slightly higher than in June though substantially below the peak of 129,000 tons in March; in July last year it amounted to 121,000 tons, the highest figure yet attained at that time. The output of chlorine and basic organic chemicals also maintained the level of the previous month during July, a fact which has raised hopes that the production decline is over. Pressure on prices still continues, and a comparison with prices in other German industries shows that chemicals are relatively cheap in proportion to pre-war and pre-Korea prices.

In the manufacturing sections of the German chemical industry, however, sales show no signs of an improvement. This applies in particular to dyestuffs, pharmaceuticals and cosmetic materials. Export figures for the early part of this year suggest that while shipments of heavy organic and inorganic chemicals continued to expand (by one-third in the first quarter of this year compared with the corresponding period of 1951), those of dyestuffs and intermediates were halved and exports of drugs and pharmaceuticals declined by one-tenth.

Exchange Agreement

Chemical trade between the Federal Republic and the Soviet zone of Germany will be given a fillip by the recent conclusion of another exchange agreement. Under arrangements made when interzonal commerce was resumed deliveries of chemical products to a total value of Dm. 11,000,000 in either direction were agreed upon. The new agreement provides for exchanges of Dm. 22,000,000. The chief products supplied by West German firms are organic dyestuffs and intermediates, caustic soda, calcined alumina, pharmaceuticals, borax, titanium dioxide and naphthalene, while the Soviet zone will deliver photographic films (for which Western Germany will supply photographic gelatine), potassium permanganate and chlorate, sodium chlorate and sulphate, higher alcohols, crude phenol, cresol and *o*-cresol, dimethyl and monomethyl amines, polyvinyl chloride, carbon tetrachloride and some other products.

Important Rôle

West German chemical products also play an important part in trade with East European countries. Though the volume of trade with the Soviet satellites is small, chemicals account for a high proportion of all shipments, especially to Rumania and Poland. Dyestuffs and pharmaceuticals are the principal West German exports of chemical interest to eastern Europe. The East European countries together, however, take less than four per cent of all West German chemical exports because these countries now rely on supplies from the nationalised chemical industry of Eastern Germany for the bulk of the chemical products which they obtained from Germany before the war insofar as they cannot produce them locally. The Soviet zone Government has concluded long-term trade agreements for the period ending in 1955 with Poland and Rumania (as well as the Soviet Union) and intends to negotiate similar agreements with Czechoslovakia, Hungary, Bulgaria and Albania, with whom trade is now proceeding under annual arrangements. East Germany supplies dyestuffs, photographic chemicals and a number of fine chemicals and pharmaceuticals to the Eastern bloc. Potash salts are sent to Eastern Europe in large tonnages from the mines in Thuringia and Saxony-Anhalt.

A German firm, Dr. C. Schleussner Fotowerke, is to co-operate with the Brazilian Government in erecting a factory for the manufacture of photographic film, especially X-ray film. German experts and German equipment will be sent to Brazil when a suitable site has been selected. The factory is to be operated on behalf of the Brazilian Government, but part of the financial funds required will be secured out of proceeds from sales by the Germany company in the Brazilian market. To enable the German firm to do so, the Brazilian Government has undertaken to grant it an increased import quota for its products.

The present West German aluminium production of about 9,000 tons is sufficient to

meet all essential requirements, and a further expansion of output is envisaged. At Luenen a third electrolytic aluminium plant was put into commission recently, raising the output at this works from 22,000 to 28,000 tons a year. The full capacity of 33,000 tons a year cannot be utilised because of shortage of electricity. Aluminiumhuette Erftwerk at Grevenbroich is to be rebuilt. It will provide 10-12,000 tons of aluminium a year from August, 1953, compared with 24,000 tons before dismantling.

Redon is the name given to the new wool-like polyacrylonitrile fibre produced by Phrix at Neumuenster, Holstein. The present output is only a few hundred kilograms a day, but plans for large-scale production are being prepared, and it is claimed that when large-scale production begins, producing costs will be below the present wool prices. Redon is said to be at least as warm as wool, slightly lighter, moth-proof and to have three times the tensile strength and seven times the abrasive strength of wool. The new fibre is claimed to be superior to the Orlon fibre which it resembles chemically, in that it can be dyed without difficulty as a fibre. At present it is being tried out for a number of purposes where its resistance to acid, alkalis and most organic solvents is of advantage.

New Mellon Fellowship

Work on Synthetic Organic Chemistry

THE donor of a new Multiple Fellowship at Mellon Institute, Pittsburgh, Pa., just announced by the Institute's President, E. R. Weidlin, is Parke, Davis & Company, Detroit, Mich. This Fellowship will carry on long-range investigations in synthetic organic chemistry, with general emphasis on chemotherapy and particular emphasis on the preparation of compounds for combating viruses and tumours.

The Fellowship, which was instituted on 15 July, is headed by Dr. Alexander M. Moore, Administrative Fellow, since 1946 a Parke, Davis specialist in the synthesis of potential drugs and in the classification of organic compounds. On his staff are Drs. Robert S. Tipson, Alice G. Renfrew and Marcus S. Morgan, and in the relatively near future several other scientists and assistants will be added to the group. A wide field is open to the Fellowship for productive work in collaboration with Parke, Davis & Company and its strong research organisation.

Dr. Moore received his Ph.D. in organic chemistry at the John Hopkins University in 1942. He was a research chemist for the Socony-Vacuum Oil Co. from 1942 to 1944, and then during the period 1944-46 he participated in a survey of antimalarial drugs that was conducted in Baltimore. Subsequently, at the close of that investigation, he joined Parke, Davis & Company, where he rose to his most recent position of laboratory director in organic chemistry.

Dr. Tipson received his professional education at the University of Birmingham in England, receiving his D.Sc. in 1945. He joined the research staff of the Mellon Institute in 1939.

Forest Conservation by Spraying

AN AERIAL spraying project, covering some 300 sq. miles, the largest of its kind in the history of Canadian forest conservation, has been successfully completed in New Brunswick.

The operation, which is stated to have cost about $500,000, was carried out jointly by the New Brunswick Government and the New Brunswick International Paper Company to check progress of the destructive budworm in a 193,000 acre Crown Forest containing over 2,000,000 cords of valuable mature pulpwood.

While the long-term effect on the balsam fir and spruce forest will not be known for some time, Federal government entomologists, who are continuing their observations on the spot, report efficient coverage and a high mortality of insects.

Unfavourable weather delayed the start of the spraying for many days. However, 20 aeroplanes dousing the forest with DDT at a rate of 125 acres a minute, completed the task just in time, before the insects entered the pupation stage.

A great deal of preliminary work had to be carried out before spraying could begin. Runways were built at the approximate centre of the spray area, and housing facilities established for the 150 people engaged in the operation.

Technical aid was supplied by the Canadian Government which also assigned a number of entomologists and other officials to the project. The U.S. Department of Agriculture co-operated and sent observers.

Collaboration in Research

DSIR Work With Industry on Germanium

RESEARCH is a continuous process and its benefits are both cumulative and far-reaching. For this reason it is seldom possible to pin-point a particular development as the culmination of a co-ordinated programme of investigations spread over several different fields. Of particular interest, therefore, is the news that germanium of adequate purity for the reliable manufacture of rectifiers and transistors is now being commercially produced in Britain. This is a notable example of the value of collaboration in research, for it has resulted from the combined efforts of both Government and industrial laboratories.

The story begins before the war, when it was reported that germanium had been discovered in British coal. There were many problems to be solved before this metal, whose unique properties were then unknown, could be transformed from a scientific curiosity into a useful material for British industry. One requirement was to find out whether the element was widely distributed in British coalfields and in what concentrations it occurred. The Fuel Research Station carried out a survey of trace elements in British coals and found that, except in the South Wales coalfields, there is apparently no marked variation in the proportion of germanium in British coals, the average concentration being about seven parts per million.

Recovery of Germanium

The problem of recovering germanium from this source was studied at the Chemical Research Laboratory before the war. The investigators found that the germanium content of coal ash was relatively small, largely due to the fact that during combustion much of the germanium present was carried up the chimney with the combustible gases and released into the atmosphere. Consideration was therefore given to the possibility that improved recoveries might be obtained from the dusts deposited inside high chimneys. Samples were accordingly taken from the flues at various gas works and it was found that the producer systems yielded about ¼ per cent of germanium and a like amount of gallium, the flue dusts from British coals being appreciably richer in both metals than American zinc residues. Methods of recovering germanium and gallium from flue ducts were successfully developed, both metals being produced at the Chemical Research Laboratory and loaned for research purposes to various institutions in Britain and overseas. Both metals are now being extracted commercially from flue dust.

Extensive Investigations

Before these new materials could be used by industrialists it was necessary that their physical properties should be examined and understood, and both metals have therefore been the subject of extensive investigations at the National Physical Laboratory.

During the war American scientists were developing important uses for germanium on the 'cat's whisker' principle. This metal is therefore of particular interest to electrical and radio manufacturers, but for electrical purposes a high standard of purity is required, among the most objectionable impurities being arsenic, which is present in the material recovered from flue dusts.

The Radio Materials Committee of the Radio Research Board have emphasised the importance of germanium as a material for use in rectifying and amplifying devices. Crystal diodes are already widely used, but crystal triodes have not at the present stage of development found large-scale applications. Among the more important limitations to their performance are poor reproducibility, high noise, low power rating, and limited frequency response. Performance is governed by the concentration and nature of the impurities in the germanium.

Arrangements were made for the Chemical Research Laboratory to investigate techniques for the purification and analysis of germanium. This involved using the radioactive tracer technique to assess the efficiency of the various stages used in existing methods for the removal of arsenic, together with the development of new methods for the chemical separation of arsenic from germanium. This work was given high priority and led to the development of a simple method of reducing the arsenic content in

germanium tetrachloride to one part in 10^{10}.

At the Radio Research Station equipment and methods have been developed for examining the electrical properties of germanium and the problem of noise, and much valuable knowledge of operational requirements has been gained.

Thus British research organisations, acting in close co-operation and starting from the discovery of a minute quantity of germanium in a sample of British coal, have made available a material capable of solving problems which were not even foreseen when the original discovery was made.

Research on both germanium and gallium is still proceeding, and it is possible that co-operative research by the National Physical Laboratory and the Chemical Research Laboratory may also lead to the development of commercial applications for the latter metal. Gallium has many interesting properties, including the remarkable variations in resistivity in the axial directions of its crystal, but much work has yet to be done before the stage of commercial development is reached.

Continuous Mica Sheets

Paper-Making Process Adapted

DEVELOPMENT work in processing mica into continuous sheets for electrical insulation, which started in France during the German occupation ,has culminated in the U.S.A. in improved economical methods for forming sheets of mica, using conventional paper-making equipment.

Raw material consists of muscovite mica in the form of domestic and mine waste, scrap, or recovered mica. The manufacture of the sheets is similar to the manufacture of paper from wood pulp.

In preparation, the mica is partially dehydrated by heating. Immediately after leaving the furnace, the hot mica is placed in a saturated solution of sodium carbonate or bicarbonate. This removes the swelling between the layers of the mica. The mass is then allowed to cool. At this stage the thin layers scarcely adhere to each other. Still containing a large amount of the alkaline solution, it has to be drained, and is then immersed in a strong solution of hydrochloric acid or sulphuric acid, which causes it to puff to as much as a hundred times its original thickness. At this point, the layers of mica are so loose that only washing and agitation are required to reduce the mica to a pulp.

The pulp is now ready to be made into a continuous sheet. It can be made on a Fourdrinier machine, the conventional mechanism used in paper-making. As the sheet comes from the machine it has about half the density of natural mica because of the air between the layers. The tensile strength depends on the source of the mica and the type of treatment it has received. Before it can be used, a binding agent must be applied. This is achieved by spraying or dip-coating.

As an example of the versatility of mica made by this process, it has been used as a component in silicone-moulding plates, while its homogeneity and uniformity make it suitable for such purposes as the manufacture of commutator segment plates, and for various types.

BWRA Conference

THE British Welding Research Association has just held a two-day 'Management Conference on Welding and Welding Research', which was the first of its kind ever held in this country.

The object of the conference was primarily to bring together for a short period in congenial surroundings leading men in industry who were either using welding with great success, using it a little, or not using it at all, with the idea that those in the last two categories could learn and be influenced by the favourable achievements of those of the first. To this end, experts lectured on the achievements of welding in the aircraft, structural, shipbuilding and chemical vessel industries.

The conference started with a session on research in industry at which the speakers were the Rt. Hon. the Earl of Halsbury on 'The Government Aspects of Co-operative Research', Sir Wallace Akers on 'What the I.C.I. owes to Research', and Professor J. F. Baker and G. Wesley Austin on the engineering and metallurgical aspects respectively of research at the BWRA.

At the conclusion of the conference a glance into the future of welding was provided by Dr. A. B. McIntosh who spoke on 'Welding Problems Encountered in the Production of Atomic Energy', and Major P. L. Teed who spoke on 'Some Metallurgical Problems Imposed by Stratospheric Flight'.

The Chemist's Bookshelf

MODERN ASPECTS OF INORGANIC CHEMISTRY. By H. J. Emeleus and J. S. Anderson. Routledge and Kegan Paul, Ltd., London. Second edition. 1952. Pp. xi +557. Figs. 68. 35s.

It is safe to say that for half a generation 'Emeleus and Anderson' has been a household name to students of chemistry. The fact that the text of the first edition survived reprinting after reprinting over a period of almost fifteen years is a proper tribute to the soundness of conception of the book and to the wise choice of the authors in the topics that they originally selected for inclusion. Certain sections—for example that dealing with radioactive phenomena—have inevitably been out of date for some years, but on the whole the chosen material survived the passage of time remarkably well.

Comparison of the texts of the two editions shows that a considerable amount of rewriting and rearrangement has been carried out in the preparation of the new edition. A portion of the opening chapter on atomic structure has been transferred and expanded to form a new Chapter III on valency. The original chapter on the solid state has been split into two chapters dealing with the constitution of solid inorganic compounds and the structure of the molecules of inorganic compounds. Considerable new material has been added to the chapter on polyacids and silicates. The chapters on hydrides, non-metallic oxides and the chemistry of the non-metals show considerable revision. Two new chapters on metals, interstitial compounds and non-stoichiometric compounds replace the single chapter which originally covered these topics. As is to be expected, the chapters dealing with the recent chemistry of the metals and with radioactivity and atomic disintegration have been very thoroughly rewritten, and much new material is included.

With all this new material, the book yet remains very little longer than the first edition. This result has been achieved by considerable deletion or compression of material which is now, properly, no longer included under 'modern aspects'.

Apart from those changes mentioned, the chapter headings follow those of the first edition. This, one presumes, is an indication that in the opinion of the authors those topics which were of importance in the inorganic chemistry of 1938 still hold a foremost place today. One wonders whether this is so, at least to the extent which the book suggests.

One suspects, for example, that the affection of examiners for the metallic carbonyls and nitrosyls as stock questions showed a marked increase when the first edition of this book appeared. Their continuation as a separate topic will continue to gain for these compounds a degree of importance which they hardly merit at the present time. Without wishing to deny the interest aroused by this group, one feels that it would have been refreshing had the authors chosen to relegate it, perhaps, to a smaller section of the extensive chapter on co-ordination compounds. The space thus released could have been employed to bring more forcibly to the notice of their readers some of the topics which have come to the fore since 1938, and which are only treated as sections or subsections of chapters in the edition as presented. The notably small alteration in the chapter on free radicals of short life would also induce the reader to presume that this topic has not advanced sufficiently in the past 15 years to warrant its inclusion in a book with this title.

However, few people can have the overall view of the field of inorganic chemistry possessed by the authors, and it may well be that their choice is still the wisest one. Whether one agrees with it in detail or not, there is no doubt that the book will continue to influence chemists strongly, presenting as it does, for students and others, an eminently readable selection from a branch of chemistry which has, for many years, suffered from a dearth of such books.—C.L.W.

HOME

Pharmaceutical Chemists

As a result of the July examinations of the Pharmaceutical Society, 59 women and 67 men became chemists and druggists, and 20 women and 38 men qualified as Pharmaceutical chemists.

New Premises Completed

The production unit, research laboratories and sales organisation of L. Oertling, Limited, are now assembled under one roof in its new works at Cray Valley Road, St. Mary Cray, Orpington, Kent. (Telephone: Orpington 5771). The factory and laboratories are equipped with some of the most up-to-date machine tools and instruments for the production of balances, while the latest techniques in temperature control and dust control have been incorporated in the buildings. All communications should now be made to the new premises. The showroom remains at 110 Gloucester Place, London, W.1.

Golf Tournament

The Society of Cosmetic Chemists of Great Britain will hold their annual golf competition on 1 October, at Walton Heath. Any member of the cosmetic industry or allied industries would be welcomed. Those interested are invited to get in touch with the hon. secretary, F. Hulley, 'Sherborne,' Yewtree Road, Dorking, Surrey. Awards to be competed for include the Firmenich Trophies, and a prize given by Messrs. Antoine Chiris Ltd.

Methane Instead of Coal Gas

A scheme to supply the greater part of Cumberland with methane from West Cumberland collieries, displacing coal gas for domestic and industrial purposes is being envisaged by the Northern Gas Board. Methane from a seam running four miles under the sea at Haig pit is already being extracted by 10 bore holes each 150 ft. to 200 ft. deep. This is the first experiment of the kind to be tried in the United Kingdom. The present yield is being consumed in the Haig pit boilers, thus releasing solid coal for the market. Methane is also a valuable raw material for the manufacture of chemical products.

Erratum

In our issue of 9 August, page 199, the new address of Monsanto's Manchester office should have been 601-612 Royal Exchange, Manchester, and not 601-602 as quoted.

Cheaper Diacetone Alcohol

A reduction of £32 a ton in the price of diacetone alcohol is announced by Shell Chemicals, Ltd. This decrease, which became effective as from 18 August, brings the price of the 100-ton drum rate down to £138 a ton. A similar reduction of £32 a ton from the same date is announced by British Industrial Solvents, Ltd.

RIC Dinner-Dance

The fourth annual dinner-dance of the London and South-Eastern Counties Section of the Royal Institute of Chemistry will be held at the Connaught Rooms, Great Queen Street, London, W.C.1, on Friday 17 October at 6.30 p.m. Tickets are limited to 170 and will be in rotation. Sir Lional Heald, Q.C., the Attorney-General, has provisionally accepted an invitation to be the Guest of Honour.

Steel Output Up

Production of steel in July was at an annual rate of 14,236,000 tons, it was announced by the British Iron and Steel Federation. While this is lower than for the previous month, being affected by the holidays, it shows an increase of 9,484,000 tons over July, 1951. The improvement over last year is partly attributed to increased pig-iron production due to new blast furnace capacity which came into production at the begnning of the month.

The Scientist & Civil Defence

'The Place of the Scientist in Civil Defence,' will be the subject of a discussion to be held at the City of London School, Victoria Embankment, London, E.C.4, at 6.30 p.m. on Thursday, 16 October. The meeting has been arranged by the London and South-Eastern Counties Section of the Royal Institute of Chemistry in co-operation with the Institute of Biology and the Institute of Physics (London and Home Counties Branch). Among the principal speakers will be Sir John Hodsall, Sir Charles Ellis, Dr. E. T. Paris, Professor W. V. Mayneord and Professor H. N. Rydon.

OVERSEAS

Indian Science Congress

Many eminent scientists from all parts of the world are expected to attend the next sessions of the Indian Science Congress. The conference, under the auspices of the Lucknow University, will be held in Lucknow from 2-8 January next year.

New Australian Uranium Finds

Latest uranium finds at Edith river, Northern Territory, Australia, are considered by experts after further surveys, to be capable of substantial development. Although ore samples are in the main good, the geological formation is such that the present problem is to ascertain the extent of the field. Surface indications show that the Edith river deposit may extend far underground. If early impressions are confirmed, a local plant to concentrate ore before smelting may be installed.

DDT Factory for India

Under an agreement signed in July by the Government of India with WHO (the World Health Organisation), a DDT factory is to be established in Delhi. The factory will have a capacity of 700 tons a year. Construction is expected to be completed by October next year and production is scheduled for February, 1954. Some of the raw materials including sulphuric acid, oleum and chlorine will be supplied locally. The entire output of DDT is to be used for public health purposes in India on a non-profit basis.

Combined Phosphate Project

Three American firms — the Stauffer Chemical Company, American Smelting and Refining Co., and Kennecott Corporation—have joined forces to form a new company for the erection and operation near Salt Lake City of a concentrated phosphate plant. The new company, so far unnamed, will have a capital of nearly $5,000,000. Phosphate rock from the desposits in Wyoming and Idaho, and sulphuric acid from the Garfield Chemical Company's plant at Salt Lake City, will be used. Completion is scheduled for 1953 when an output of 60,000 tons a year is estimated. Phosphoric acid will also be produced—wet process—and the recovery of uranium and vanadium is planned.

Sulphur Production in the U.S.A.

Output of sulphur in June in the U.S.A. amounted to 443,017 long tons (native) and 19,289 tons (recovered, 97 per cent purity or greater), according to reports of producers to the Bureau of Mines, United States Department of the Interior. Producers' stocks of native sulphur increased by about 75,000 tons over the previous month and at the end of June amounted to 2,902,335 tons.

Norwegian Campaign Against Rust

An extensive research into rust prevention is being organised in Norway by the Study Society for Norwegian Industry. Seven control stations are to be set up in various parts of the country. At each station a number of standardised steel plates will be erected exposed to climatic conditions. The plates will be treated with paint and metal protectives and regularly examined by travelling inspectors who will collect data and make deductions concerning the most effective preventatives.

Wood Warping Prevented

A new chemical preparation which stabilises wood against swelling, shrinking and warping and also primes surfaces for paint is being distributed throughout the United States, according to reports. It is manufactured by Felsonite Chemical Products, Inc., of Grand Rapids, Michigan, and is marketed under the name of 'Paintseal.'—B.U.P.

Japanese Selenium

A new Japanese works has begun production of selenium for the Republic Chemical Corporation, of New York, it is announced. The works has been built and is wholly owned by the firm's Japanese subsidiary, Republic Chemical (Japan), Ltd., of Tokio. It is working on a large number of orders and its output is being allocated by countries and consumers. In the U.S.A. the metal is controlled by the National Production Authority.

The new Japanese works is modern in design and construction. It was built and its equipment installed under the supervision of a leading Japanese selenium expert. Selenium being produced there is said to be 99.9 per cent pure, in powder form.—B.U.P.

Publications & Announcements

A FOUR-page leaflet describing its 'Microfilter' dust respirator is being distributed by Siebe, Gorman & Co., Ltd., Neptune Works, Davis Road, Tolworth, Surrey. As well as giving a detailed description of the respirator, instructions for use and maintenance are also included. The leaflet is well illustrated with large, clear, photographs. The 'Microfilter' dust respirator owes its inception to the Committee on Industrial Health of the British Steel Founders' Association which requested an efficient, comfortable respirator capable of being worn for long periods under the arduous conditions involved in the finishing of steel castings. It bears the Ministry of Labour and National Service registered Certification Mark and is approved for use under the Asbestos Industry Regulations of 1931.

* * *

A NEW type of refining plant, the autofiner, recently erected at Llandarcy by the Anglo-Iranian Oil Company for a catalytic desulphurisation process with a capacity of 3,500 barrels per stream day, is described and illustrated in the August issue (Vol. 28, No. 4) of the *BP Magazine* (formerly *Naft Magazine*). Other interesting articles tell of M.P.s and journalists at the Kent refinery, the romantic background of Middleton Hall, now the technical headquarters of Scottish Oils, and the formation and expansion of British Petroleum Chemicals, Ltd., at Grangemouth.

* * *

'RATIONAL Chemical Production' is the title of a special issue of *Chemische Industrie* (Part 7, 1952 (July)). Without quibbling unduly about the number of pages (112 advert. and 116 text, making 228 in all) this special issue contains much interesting matter on rationalising chemical production. It begins with the difficult question of rationalising sales or market quotas by means of sales organisations (Vertriebsgemeinschaften); and then proceeds to deal with the introduction of rational organisation plus technical efficiency into chemical industry generally, to research, power supply, transport, etc. Special articles are included on corrosion prevention in iron construction through zinc metallising, the dust problem, packaging, etc. A chapter on 'Farbdynamik' emphasises the importance of bright cheerful working premises, or in other words the psychological effect of paint. Reference is made to American experience here, and it is suggested that good team work between architect, painter, engineer, and psychologist is essential. The rather lengthy article on rationalisation in the chemical industry deals mainly with supplementary services such as tool and material stores, power and lighting, interworks transport and so forth, which are considered in some detail, based on experience with about 23,000 employees at eleven different chemical works. During the past 1½ years much attention has been given to questions of interchange of experience in these matters, and the part that scientific and technical organisations can play therein.

* * *

SUCCESSFUL use of aluminum heat exchangers instead of steel for treating natural gas in its glycolamine process is reported by the Fluor Corporation in the July issue of *Aluminium News* (Vol. 5, No. 7) published in English, Spanish and German, by the Aluminium Union, Ltd., Montreal, Canada. Another novel application of aluminium described and illustrated is its combination with kraft paper to produce a one-trip oil drum. Developed by Pacific Steelfiber Drums, Inc., of Alhambra, California, in co-operation with Kaiser Aluminium and Chemical Corporation, the fibreboard-aluminium combination provides a lightweight container which is non-porous, moisture-vapour proof and corrosion-resistant, while its non-sparking property provides an additional safety factor.

* * *

CONGRATULATIONS to *Chemical Engineering* which celebrated its 50th anniversary with a bumper July issue. Besides tracing the growth of chemical engineering during the last half century, problems of the future are considered from selected reports of more than 100 authorities in 25 different industries. The present period of accelerated growth is thus comprehensively surveyed and some challenging ideas provided on the prospects of chemical engineering in industry. The issue also contains, of course, all the usual news and features.

SOLDERLESS brass fittings for use with fluids, gases, compressed air and hydraulic circuits as a means of connecting copper pipe lines offer indisputable advantage over the older method of employing iron pipes and screwed fittings with all the troubles of rusting and leaky joints. A chart illustrating its full range of solderless connections together with a revised edition of its catalogue (List No. SF.251) is now available from Benton & Stone, Ltd., Birmingham. Arrangements have been made with the British Bundy Tubing Co., Ltd., to supply their tubing for use with lubricating and pneumatic equipment. Bundy tubing comprises two tubes of steel strip, wrapped one around the other with their seam diametrically opposite, and brazed in a specially designed electric resistance brazing unit, to produce a tube of double wall structure, with a clean, scale-free coppered interior, a tinned external surface and a consistently uniform wall thickness. The tubing combines ductility with strength and is pressure tested in oil to 6,000 p.s.i. unless otherwise specified.

* * *

FINAL arrangements have now been made for the purchase by the British Association of chemists of the freehold property of No. 14, Harley Street, London, W.1, as its new headquarters, it is announced in the July issue of its journal *The British Chemist* (No. 148). The important question of designatory letters and the advantage to members of using M.B.A.C. or A.B.A.C. is discussed in an article by Mr. Norman Sheldon, A.R.C.S., F.R.I.C., M.B.A.C., F.R.S.A., as well as in the correspondence columns. The president, Mr. C. A. Wylie, in a letter, describes his visit while in Salisbury, Southern Rhodesia, to Mr. Brewer, chief chemist at the Government Geological Survey.

* * *

NEW developments in blast furnace operation and design are discussed in the August issue of *Steel News* (Vol. 3, No. 2), published by the British Iron and Steel Federation. Other articles describe Dunraven Castle, Bridgend, which was recently the site of the first two residential courses for steelworks foremen, the craftsmanship and skill required in the manufacture of steel surgical instruments and the problem of measuring productivity which confronted the team of the British Iron and Steel Industry when it visited the U.S.A.

METAL bonding resins for joining metal to wood, glass, rubber and so on, and the attractive possibility of their application to the silver and jewellery industries are described in a non-technical manner in Bulletin No. 13 (August) issued by the Design and Research Centre. As a result of the success of the publication of a series of technical abstracts in its last issue, this feature has again been included, but further expressions of approval are thought necessary before making this a regular item.

Soil Conditioners

Full Inquiry in U.S.A.

A FULL inquiry into the new soil conditioner industry is to be made by the U.S. Federal Trade Commission, it is reported. This may lead to measures against some of the dozens of small firms which have been rushing in the last few months to get a footing in this new market.

Complaints have been received by the Commission that some brands of soil conditioners are not all that is claimed.

They cannot act on these complaints, however, until they have some idea of the real value of soil conditioners and can set a standard of fair advertising claims.

Only if it is found that manufacturers are making claims for their products which they cannot substantiate can any action be taken against them.

The Monsanto Chemical Company and American Cyanamid have welcomed the investigation. They fear that less reputable firms which have followed them into the market may try to sell inferior products with claims that cannot be supported, thus turning the public against all soil conditioners. The U.S. Department of Agriculture has also been watching soil conditioner developments, and it recently issued an official warning to users to be careful, buying only small quantities and using them on an experimental basis.

Sales of one of the minor soil conditioners have already been banned by the Virginia Department of Agriculture. This action was taken, said an official announcement, because the product did not meet the requirements for fertiliser in Virginia.

If the complaints of other dissatisfied users of other soil conditioners are found to be justified, similar action may be taken throughout the country.—B.U.P.

Law & Company News

The following are taken from the printed reports, but we cannot be responsible for errors that may occur

Mortgages and Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described herein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages or Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary but such total may have been reduced.)

BAMAG LTD. (formerly Bamag-Meguin (Great Britain) Ltd.), London, S.W., engineers. (M., 23/8/52.) 18 July, two charges, to Westminster Bank Ltd. each securing all moneys due or to become due to the Bank; respectively charged on 5 Rickett Street and 5 and 6 Roxby Place, Fulham. *Nil. 1 January, 1951.

BOWMANS CHEMICALS LTD., Widnes. (M., 23/8/52.) 22 July. £100,000 debenture stock with a premium of 2 per cent in certain events secured by a Trust Deed dated 14 July, 1952; charged on specified properties at Widnes, Warrington and Hale, and a general charge. *£60,030. 23 January, 1952.

W. & J. GEORGE & BECKER LTD., Birmingham, chemical apparatus manufacturers, etc. (M., 23/8/52.) 21 July. £65,000 debenture, to Industrial & Commercial Finance Corporation, Ltd.; charged on specified properties at Birmingham, with fixed plant and machinery, right to receive certain compensation and present and future loose plant, machinery, equipment and vehicles. *£3,000 on property. £64,682 Bankers. 31 October, 1951.

Satisfaction

VINYL PRODUCTS LTD., Carshalton, chemical manufacturers. (M.S., 23/8/52.) Satisfaction 26 July, of debenture registered 24 February, 1947.

New Registrations

Venadrin Ltd.

Private company. (510,531). Capital £100. Manufacturers of chemicals and chemical products. Directors: J. Wilson, L. Phillips. Reg. office: Atlas Chambers, King Street, Leeds.

Chilcott Laboratories Ltd.

Private company. (510,427). Capital £500. Manufacturers of pharmaceutical, medicinal, chemical, industrial and other preparations, etc. Directors: P. G. E. Warburton, K. J. Golds, F. A. S. Gwatkin, and R. F. Caldersmith. Reg. office: Power Road, Chiswick, W.4.

Company News

The Distillers Company, Ltd.

Manufacturing and trading profits of the Distillers Co., Ltd., and its subsidiary companies for the year ended 31 March, 1952, are shown in the 75th report and statement of accounts as £21,265,450. Net profit attributable to the group was £7,170,450 (£6,858,925). A sum of £1,578,000 has been transferred to the Stock Contingencies Reserves. A final dividend of 7 1/5d. per 4s. unit (less tax) on ordinary stock is recommended. At the annual general meeting to be held in Edinburgh on 12 September a resolution will be submitted effecting the reconversion of the £22,589,770 issued ordinary stock into 112,948,850 shares of 4s. each without distinguishing numbers and a special resolution to sub-divide 2,320,000 of the unissued shares of £1 each into 11,600,000 unissued shares of 4s. each. In view of the sub-division of ordinary shares a special resolution will also be considered to amend article 59 of the company's Articles of Association so as to preserve the position as regards voting between the preference stockholders and the holders of ordinary shares.

Powell Duffryn Limited

The directors announce that the annual general meeting will be held on 24 September, 1952.

The consolidated net profit for the year ended 31 March, 1952, is £731,686 (previous year £604,934) after crediting transfer from taxation reserves £51,704 (£72,452) and after charging depreciation £347,467 (£310,516) and taxation £1,253,045 (£1,041,460).

The directors recommend payment of a final dividend of 5 per cent actual, less income tax at 9s. 6d. in the £ on the £9,660,471 ordinary stock in respect of the year ended 31 March, 1952 (making with the interim dividend of 3 per cent actual, paid on 23 February, 1952, 8 per cent for the year).

(continued on page 276)

B.D.H.

Micro-Analytical Reagents

'M.A.R.'

As from the 1st November, 1951, the micro-analytical reagents issued by The British Drug Houses Ltd. to which the designation 'M.A.R.' is applied will conform to new quantitative specifications which have been published separately. These revised and more exacting specifications have been approved by the Microchemistry Group of the Society of Public Analysts and other Analytical Chemists, with whose advice and assistance they were prepared

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MAR/I

The amount at the credit of the Consolidated Profit and Loss Appropriation Account to be carried forward to 1952-53 is £2,174,673 (£1,976,407 after transferring to reserve £318,827 the balance of a company liquidated during the year 1951-52).

Payment of the dividend will be made on 30 September to holders registered on the books of the Company at the close of business on 14 August, 1952.

Market Reports

LONDON.—While there has been no pronounced return to activity in the industrial chemicals market some improvement has been reported in the volume of inquiry for new business. Buying is mainly for nearby requirements and with the supply position now much easier, buyers are hesitant to enter into long-term commitments until the general situation is less uncertain. Recent price reductions include tartaric acid, which is now quoted at £12.5 per cwt. and zinc oxide which was reduced by £9 per ton following the lower price for the metal. It is understood that the subsequent increase in the price of the metal by £4 per ton is unlikely to have an immediate effect on the new price for the oxide. English lithopone is now being offered at £60 10s. per ton. Rather dull conditions prevail in the coal tar products market.

MANCHESTER.—Relatively quiet conditions have again been experienced as regards the demand from the textile and allied trades, as well as from one or two other industrial outlets, but in spite of this and the continued seasonal influence there has been a fair amount of inquiry for the regular lines, including the alkali products. Prices have been maintained, with a slight recovery in the zinc compounds after the sharp fall reported a week ago.

Injunction Against Imperial Chemical Industries

AN injunction restraining Imperial Chemical Industries, Ltd., from parting with certain patents for the manufacture of nylon, pending the hearing of an action by British Nylon Spinners, Ltd., was granted by Mr. Justice Upjohn in the Vacation Court on 13 August.

I.C.I., said the judge, were originally licensees of the American corporation of du Pont and granted sub-licences to the nylon company, giving them certain exclusive rights in particular countries.

In August, 1947, du Pont's assigned British patents to I.C.I., who became the owners of the patents. I.C.I. then wrote to the nylon company pointing out that a formal agreement would be necessary changing the nylon company's status from that of sub-licensees to licensees from I.C.I. That formal agreement was not completed, but it was quite clear that the parties had conducted their business on the footing of I.C.I.'s letter.

In 1944 proceedings were instituted in the U.S. under the Sherman Anti-Trust Act, and on 30 July, 1952, the U.S. Court ordered I.C.I. to reassign the patents to du Pont's within 90 days, expiring on 28 October.

Under the terms of this judgment, it was clear, said Mr. Justice Upjohn, that any nylon products lawfully manufactured in the U.S.A. could be imported into Great Britain, although infringing British patents and no complaint could be made by I.C.I.

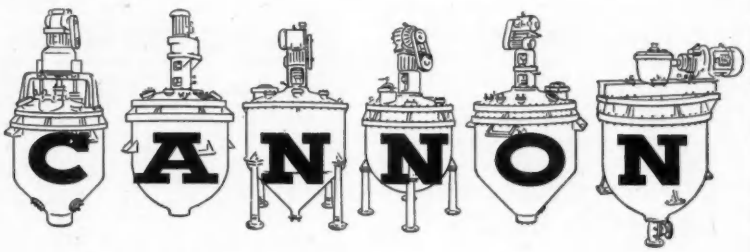
In effect the nylon company was seeking an injunction to restrain I.C.I. from carrying out the order of the U.S. Court. If I.C.I. reassigned the patents before the nylon company obtained specific performance of the agreement of 1947, the company would be without remedy.

'It would be quite wrong to suppose', said the judge, 'that a Court of foreign jurisdiction has power to impose on a company domiciled in this country an order which would compel it to break contracts entered into quite properly in this country. Indeed the American judge seems to have had certain doubts on the matter himself'.

Mr. Justice Upjohn said he had sympathy with I.C.I. in their difficulty, and it appeared that it would be faced with having to break one injunction or the other.

For I.C.I., Mr. Rodger Winn, said that the difficulty could probably be avoided if the trial of the action could take place before the expiration of the 90-day order, but it was doubtful if it could be done in the time.

Mr. Justice Upjohn said he was prepared to certify that it was an action fit for speedy trial.



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The engagement of persons answering these advertisements must be made through a Local Office of the Ministry of Labour or a Scheduled Employment Agency if the applicant is a man aged 18-64 inclusive, or a woman aged 18-59 inclusive, unless he or she, or the employment, is excepted from the provisions of the Notifications of Vacancies Order, 1952.

SENIOR SCIENTIFIC OFFICERS, SCIENTIFIC OFFICERS, PATENT EXAMINER AND PATENT OFFICER CLASSES. The Civil Service Commissioners invite applications for permanent appointments to be filled by competitive interview during 1952. Interviews will continue throughout the year, but a closing date for the receipt of applications earlier than December, 1952, may eventually be announced. The Scientific posts are in various Government Departments and cover a wide range of Scientific research and development in most of the major fields of fundamental and applied Science. The Patent posts are in the Patent Office (Board of Trade), Admiralty and Ministry of Supply.

Candidates must have obtained a University Degree with First or Second-class Honours in an appropriate Scientific subject (including Engineering) or in Mathematics, or an equivalent qualification ; or for Scientific posts, possess high professional attainments. Candidates for Senior Scientific Officer posts must in addition have had at least three years' post-graduate or other approved experience. Candidates for Scientific Officer and Patent posts, taking their degrees in 1952, may be admitted to compete before the result of their degree examination is known.

Age Limits.—Senior Scientific Officers, between 26 and 31 ; for Scientific Officers and Patent Classes, between 21 and 28 during 1952 (up to 31 for permanent members of the Experimental Officer class competing as Scientific Officers). London Salary Scales : Senior Scientific Officers (men), £812-£1,022 ; (women), £681-£917 ; Scientific Officers (men), £440-£707 ; (women), £440-£576; Patent Examiner and Patent Officer Classes (men), £440-£655. (Rates for women under review.) Somewhat lower rates in the Provinces.

Further particulars from the Civil Service Commission, Scientific Branch, Trinidad House, Old Burlington Street, London, W.1, quoting No. S.53/52 for Senior Scientific Officers and S.52/52, S.128/52 for the other posts. 16045/120/WP.

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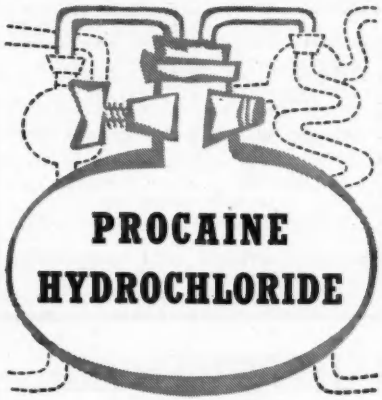

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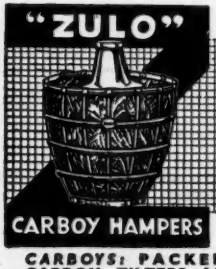

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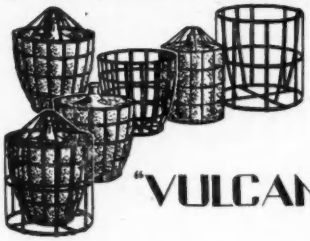

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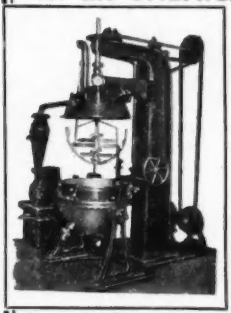

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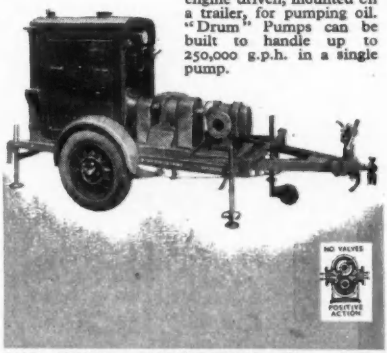

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